

POWER, PARADIGMS AND PERSPECTIVE:
FRAMEWORK OF OPPORTUNITY IN THE REVOLUTION IN MILITARY AFFAIRS

A thesis presented to the Faculty of the U.S. Army
Command and General Staff College in partial
fulfillment of the requirements for the
degree

MASTER OF MILITARY ART AND SCIENCE

by

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B.S. United States Naval Academy, Annapolis, Maryland, 1982

Fort Leavenworth, Kansas
1995

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19951018 081

QUALITY INSPECTED 5

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0180

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0180), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE 2 June 1995	3. REPORT TYPE AND DATES COVERED Master's Thesis, 2 Aug 94 - 2 Jun 95
----------------------------------	-------------------------------	--

4. TITLE AND SUBTITLE	5. FUNDING NUMBERS
-----------------------	--------------------

Power, Paradigms, and Perspective: Framework
of Opportunity in the Revolution in Military Affairs

6. AUTHOR(S)	7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
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Fort Leavenworth, Kansas 66027-6900

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSORING/MONITORING AGENCY REPORT NUMBER
---	---

11. SUPPLEMENTARY NOTES	12a. DISTRIBUTION/AVAILABILITY STATEMENT	12b. DISTRIBUTION CODE
-------------------------	--	------------------------

Approved for public release, distribution
is unlimited.

A

13. ABSTRACT (Maximum 200 words)

This thesis adopts the adversary's perspective to consider the revolution in military affairs, thereby breaking free of the intellectual constraints imposed by the American paradigm of warfare, doctrine and force structure. The adversary's need to circumvent our overwhelming military superiority is the starting point for a revolution in thought from which might spring a true revolution in military affairs. A new intellectual framework for war is outlined. This forms the basis for rational but unconventional conjecture regarding strategies adversaries might use. It is based on the ongoing transformation of global society and the most recently developed concepts from today's sciences. Its centerpiece is an alternative to the classic center of gravity model employed to focus strategies of war. Based on dissipative structures this model better accounts for a thinking, non-monolithic enemy, unpredictability, diverse forms of conflict, and developments that transcend what is commonly considered as the revolution in military affairs. Our adversaries will fulfill their need to circumvent American military superiority with opportunities in the pervasive Third Wave and new concepts from today's science. The resultant revolution in thinking will revolutionize warfare. There, forms of warfare that include other than traditional military power are not only possible but likely.

DTIC QUALITY INSPECTED 5

14. SUBJECT TERMS	15. NUMBER OF PAGES
-------------------	---------------------

Revolution in Military Affairs (RMA), Instruments of Power
Paradigms, Center of Gravity, Dissipative Structures,
Revolution in Thought

130

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
--	---	--	----------------------------

Unclassified

Unclassified

Unclassified

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NSN 7540-01-280-5500

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Block 9. Sponsoring/Monitoring Agency Name(s) and Address(es). Self-explanatory.

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THESIS APPROVAL PAGE

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DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
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Accepted this 2nd day of June 1995 by:

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ABSTRACT

POWER, PARADIGMS AND PERSPECTIVE: FRAMEWORK OF OPPORTUNITY IN THE
REVOLUTION IN MILITARY AFFAIRS, LCDR Eric Paul Reed, USN

This thesis adopts the adversary's perspective to consider the revolution in military affairs, thereby breaking free of the intellectual constraints imposed by the American paradigm of warfare, doctrine and force structure. The adversary's need to circumvent our overwhelming military superiority is the starting point for a revolution in thought from which might spring a true revolution in military affairs.

A new intellectual framework for war is outlined. This forms the basis for rational but unconventional conjecture regarding strategies adversaries might use. It is based on the ongoing transformation of global society and the most recently developed concepts from today's sciences.

Its centerpiece is an alternative to the classic center of gravity model employed to focus strategies of war. Based on dissipative structures, this model better accounts for a thinking, non-monolithic enemy, unpredictability, diverse forms of conflict, and developments that transcend what is commonly considered as the revolution in military affairs.

Our adversaries will fulfill their need to circumvent American military superiority with opportunities in the pervasive Third Wave and new concepts from today's science. The resultant revolution in thinking will revolutionize warfare. There, forms of warfare that include other than traditional military power are not only possible but likely.

ACKNOWLEDGMENTS

This thesis would not have been possible without the assistance of a great number of people. My thesis advisory committee of Rich Zak, Geoff Demarest, and Bob Walz provided throughout the right balance of encouragement, patience, and reality checks - with regard to both subject and deadlines - to ensure that what might have been an endless project was completed. The staff, faculty and students (especially those in staff group 19b) of the Command and General Staff Course patiently endured my countless questions, unorthodox ideas, and general deviling with good humor. For the most part, they did not confuse the devil's advocate with the devil. I owe a debt of gratitude to the staff of the Combined Arms Research Library for their research assistance and their forbearance. And last but certainly not least, my wife Katie, who knew what she was getting into but did so anyway; and my sons Zachary, Nicholas, and Jack, who remind me daily to consider things from a different perspective.

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It is probably true quite generally that in the history of human thinking the most fruitful developments frequently take place at those points where two different lines of thought meet. These lines might have their roots in quite different parts of human culture, in different times or different cultural environments or different religious traditions: hence if they actually meet, that is, if they are at least so much related to each other that a real interaction can take place, then one may hope that new and interesting developments may follow.

Werner Heisenberg

CHAPTER ONE

INTRODUCTION

To prepare for war demands, then, the exercise of imagination.

- Douhet, Probable Aspects of Future Wars

. . . to make sense of today's great changes, to think strategically, we need more than bits, blips, and lists. We need to see how different changes relate to one another.

- Alvin Toffler, Powershift

The future does not equal the past. We can not hope to adapt to, or even successfully anticipate, the nature of future war unless we understand the ongoing transformation of society, the limits imposed by our way of thinking, and how both are perceived by others. For, despite its defining characteristic of physical violence, war is fundamentally an attack on the intellect, persuasion: "an act of force to compel. . . ." ¹ Our adversaries will seek to compel using any means they perceive to be decisively persuasive. This is why war "is a veritable chameleon, . . . in each concrete case it changes somewhat its character. . . ." ² War changes because its context--civilization and society--and creators change. America changes, our adversaries change, the way each perceives itself and its opposite changes. (On a very basic level war is about change, with one or both sides fighting to alter the previous status quo.) Various adversaries assess the relationship between their abilities, the opportunities of the moment and enemy vulnerabilities differently. The only constant is a never-ending struggle to gain a compelling, relative advantage. This struggle manifests itself in intrigues or strategies,

destruction of the enemy or his capabilities, and the unintended and unexpected outcomes that result from the infinite variety of interactions of the first two. Or, as Clausewitz, the foremost western military theorist more eloquently put it, "a paradoxical trinity"³ of rational thought, violence, and chance is the essence of this no-holds-barred struggle between competing intellects to gain a compelling advantage. Historically, such advantage is to be achieved where the enemy can be surprised, or where he is relatively weak. This is key to understanding the revolution in military affairs (RMA).

This thesis argues that the revolution in military affairs is most appropriately viewed as a revolution in thinking about war, or perhaps more precisely, strategies. Here, RMA is not the sufficient cause of the next great transformation of war but rather the foreseeable consequence of a larger transformation in society or civilization. This larger phenomenon makes possible new patterns of thought because it brings with it new capabilities, new processes and new objectives. These new things are both the cause and result of new concepts designed to explain and exploit them. These revolutionary capabilities, processes and objectives are inseparable and virtually indistinguishable from the innovative ideas that accompany them, but it is certain that these new things demand new thinking. New things and new thinking presage a revolution in strategies. The potential of such new strategies will be exploited, if not by us, then by those who seek to avoid our strength when they challenge us.

Consequently, this thesis adopts the adversary perspective in order to develop an intellectual framework--perhaps the outline of a new paradigm--for war that is fundamentally different than the one we use now. A strategy based on such a new framework might conceivably circumvent our strategy. This framework is derived from a combination of observed transformations in society and some of the most current developments in science. The inclusion of society's transformation ensures the framework's contextual relevance; the latest science enhances its

conceptual relevance. Innovation is possible in both areas. This combination of new things and new thinking is used to consider scenarios of war that employ strategies with a radically different emphasis, at least, than the traditional American vision of war.

One outcome of the new framework is an alternative to the traditional center of gravity metaphor that we now view as the key to decisive effects in war. Changes in society, specifically the dynamic redistribution of power, indicate that a center of gravity is no longer an adequate depiction of nations or others at war. Today, too, science challenges the metaphor's basic assumptions of determinism, causality, objectivity and discrete effects. The alternative model is based on the description of dissipative structures from the science of biology. While it may not completely supplant the center of gravity model, it may better account for a thinking enemy and the generally acknowledged understanding that lasting decisive effects come only from within. The dissipative structures model may have greater applicability across a broader spectrum of war or conflict.

The thesis is thus organized to provide an overview of current thinking in Chapter One, focusing specifically on why we need a fresh perspective on the revolution in military affairs. Chapter Two reviews some of the current literature on the subjects of RMA, change in society, and war. The literature review is purposely broad to consider new perspectives, and avoid taking the subject out of context. Chapter Three develops the new framework. It begins by tracing the origins of our mostly Clausewitzian paradigm of war in Newton's science and dynastic societies. It further notes where important changes in science and society argue for new thinking and then contrasts concepts from today's sciences with those from the earlier framework. Scenarios based on the new framework constitute Chapter Four, and Chapter Five presents consequences and implications. But this attempt to discern the future begins with the present, and the need for a fresh perspective.

The Western Way of War . . . American Style

Our very military strength may be the source of our greatest vulnerability. An honest self assessment might acknowledge that we are too emotionally attached to, and heavily invested in, the western way of warfare. The "western way" uniquely regards war as both an abnormal human condition and the means of last resort. According to Seabury and Codevilla, only the western tradition of warfare requires exceptional moral justification.⁴

While perhaps no longer as unique a tradition as the authors imply, these qualities do characterize western and, by extension, American thinking on war. Projecting onto others our own traditions, Americans are historically surprised and outraged when our adversaries initiate a war, or otherwise employ violent force to secure their ends, even when we acknowledge a preceding conflict of strategic interests. To us, their ends do not "justify" their means. To the large mass of humanity that are our potential adversaries, though, this is not even a consideration.

Another tenet peculiar to our philosophy of war is that the military instrument of power is almost exclusively decisive. This is both cause and effect of our Judeo-Christian beliefs. If war is "an aberration to be justified in detail,"⁵ presumably part of its justification is that it works when nothing else will. Yet Sun Tzu considered military power to be only, at best, the coup de grace for an enemy properly prepared by other means; resorting to military force was certainly not the "acme of generalship." Even Clausewitz is frequently misinterpreted on this point: historian John Keegan notes that Clausewitz actually wrote that war is the "continuation of political intercourse with the intermixing of other means."⁶ Both Sun Tzu and Clausewitz were more careful than we to consider the military instrument in conjunction with, rather than as a replacement for, other instruments of power.

Russell Weigley, however, challenges the notion that the military instrument of power retains its presumed monopoly of decisiveness:

At no point on the spectrum of violence does the use of combat offer much promise for the United States today. . . . Because the record of non-nuclear limited war in obtaining acceptable decisions at tolerable costs is also scarcely heartening, the history of usable combat may at last be reaching its end.⁷

Others agree, pointing to a "hypertrophy of war" that has withered war from an instrument of policy to one of defense alone, and justified only in an extremity of crisis.⁸ Many others note also the paradox of declining decisiveness in the face of increasing destructive capability.⁹ While Weigley is perhaps overly pessimistic in light of recent successes in Grenada, Panama and Haiti, John Keegan seems to believe the Gulf War proves his point:

In the Gulf a Clausewitzian defeat was inflicted by the forces of the coalition on those of Saddam Hussein. His refusal, however, to concede the reality of the catastrophe that had overtaken him, by recourse to a familiar Islamic rhetoric that denied he had been defeated in spirit, whatever material loss he may have suffered, robbed the coalition's Clausewitzian victory of much of its political point. Saddam's continued survival in power, in which the victor's seem to acquiesce, is a striking exemplification of the inutility of the 'Western way of warfare' when confronted by an opponent who refuses to share its cultural assumptions.¹⁰

Keegan's analysis indicates that both Saddam and the coalition are claiming victory. While ludicrous to us, our assessment is perhaps less important than that of our regional allies and enemies. To win future wars, we must not only shape the battlefield but the perceptions of our adversaries. Either our adversaries must agree to our definitions of victory and defeat, or we must re-define war as something other than a zero-sum phenomenon. Otherwise, our efforts to anticipate and adapt are likely to be meaningless or futile.

Same War Different Battlefields

The Vietnam War provides a familiar example of the clash of cultural assumptions. America possessed the better force by every imaginable standard. Americans won every major battle but lost the war. We were beaten by a superior strategy. This strategy attacked our

perceptions and, contrary to our conceptual framework, viewed the military instrument of power as a catalyst rather than the defeat mechanism:

The supreme command for the Viet Cong / North Vietnamese Army (VC/NVA) forces had a coherent strategy for conquering South Vietnam that the Americans neither fully appreciated nor effectively countered. In general terms, Communist strategists followed Mao-Tse-tung's principles of guerilla war. But ever inventive, the Vietnamese Communists adapted strategies for their unique circumstances. It was a strategy devised in the early 1960's when America only had advisers in Vietnam, and tenaciously clung to during the difficult years of massive US military activity until final victory. In essence, it proved a war-winning strategy.

The overriding goal was to effect a withdrawal of American forces from South Vietnam to bring about negotiations leading to a new, Communist-dominated government in the south. To achieve this political end the National Liberation Front fought on three fronts: political, military and diplomatic. The political battle involved mobilizing support from the people of South Vietnam while undermining the South Vietnamese government. The military component required confronting the Americans and their Allies on the battlefield to inflict losses whenever possible. On the battlefield there were no objectives that had to be held. The diplomatic element of the three-prong strategy focused on mobilizing international opposition to the American war effort and promoting anti-war sentiment in the United States. As explained by a high-ranking Viet Cong:

"Every military clash, every demonstration, every propaganda appeal was seen as part of an integrated whole; each had consequences far beyond its immediately apparent results. It was a framework that allowed us to view battles as psychological events."¹¹

Less well resourced than Americans, the North Vietnamese crafted a strategy that avoided trading military resources for military objectives. They circumvented American strengths to attack American vulnerabilities. Like Kutusov against Napoleon, and ironically, George Washington against the British, the North Vietnamese mostly avoided decisive military engagements. Washington, too, despaired of winning a decisive engagement¹² and instead hoped that the British would tire of attrition, or that diplomacy, more vital Continental concerns and long British lines of communication would combined to give him a decisive, local, relative advantage; as ultimately happened at Yorktown.

Such historical precedents exist because this circumventing action is an enduring, natural and rational survival mechanism for the weaker belligerent; and survival is the prime imperative for combatants. This is

Delbruck's strategy of attrition, exhaustion or erosion; employed by the side whose means are not great enough to pursue the direct overthrow of the enemy and who therefore resorts to an indirect approach.¹³ For the North Vietnamese, the indirect approach manifested itself as the Tet Offensive, which was designed not to destroy American forces but to spur uprisings in the south.¹⁴ The (initially) unintended but decisive impact on American public support has not been lost on those who would influence Americans: subsequent to the invasion by Iraq, one of the first acts of the exiled Kuwaiti government was to hire an American public relations firm. Although robbed of most of the traditional trappings of national power by Iraq, and weaker than their adversary by almost every measure, the Kuwaiti's resorted to the power of ideas to persuade Americans that Kuwait's interest were America's interests. The North Vietnamese fought on the same compelling, conceptual battlefield to persuade that South Vietnam's interests were not America's. Power, the ability to accomplish one's ends, takes many forms.

Without a Well-Bred Horse

One of the reasons Jonathan House gives to explain why only the Germans fully exploited the potential of the technological developments preceding World War II to create blitzkrieg is what might be called the "Phoenix Factor." Unlike their adversaries, "they had been deprived of their weapons by the Versailles Peace Treaty of 1919 and could therefore start fresh."¹⁵ This seems analogous to the position our adversaries are placed in by our overwhelming military strength. We can anticipate that our adversaries will start fresh and attempt to circumvent our strength. While we struggle to justify and retain a force structure that has, in the past, ensured military success, they will search for the power--not necessarily military power--to neutralize it. If we would anticipate the wars of the future we must, like our adversaries, direct our search beyond

the constraints of the "western way of warfare," or what has become the American style of warfare.

The two might be distinguished by their interpretation of proportionality. While both acknowledge wars of limited objectives, the American style, particularly since the Vietnam War, has increasingly been marked by the desire to bring virtually unlimited or overwhelming force to bear. The generation of tremendous relative advantage, in the form of overwhelming force, has become a de facto pre-condition to American warfighting. Consequently, this is what we seek after in the current revolution in military affairs. As skeptically described by A. J. Bacevich, we have come to believe that

future wars will follow rules suited to the military's long-standing preferences: with politicians kept at some remove and the people observing appreciatively, generals will preside over neatly defined campaigns and battles, producing in short order and at tolerable cost the victories required to restore international comity. It is a vision of the Persian Gulf War replayed over and over again.¹⁶

This ideal vision includes a commonly accepted boundary of what may constitute overwhelming force. Weapons of mass destruction, terrorism and all else that does not "follow rules suited to the military's long-standing preferences" are out of bounds. This view of appropriate and proportional force is exceedingly beneficial to the sole remaining military superpower.

Such thinking is indicative of a shared set of beliefs among American military professionals, a paradigm, that extends also to what we do not seek in the revolution in military affairs. Because the only effective military force we can conceive of is one similar to, but better than, the one we possess, the only opportunities we exploit are ones that enhance our force in its present form. Bacevich describes this narrow-minded approach as "preserving the well-bred horse." His epithet is a pointed reference to an earlier instance of military myopia on the part of British Field Marshall Sir Douglas Haig. He notes that,

It was Haig who a year into the war [World War I] could inform the War Office with utter conviction that "the machine gun is a much overrated

weapon, two per battalion is more than sufficient." Even after the war, this redoubtable cavalryman was still insisting that mechanical wonders like airplanes and armored vehicles would find use in campaigns "only [as] accessories to the man and horse." "As time goes on," Haig predicted in 1925, "you will find just as much use for the horse-the well-bred horse-as you have ever done in the past."¹⁷

In the current revolution in military affairs we see, like Haig, only accessories for our stable of well-horses. What, though, does the RMA offer those without so fine a stable, and thus a different paradigm? This thesis seeks to answer that question.

Concepts and Combat

Our philosophy of war springs from paradigms provided by Newton and Clausewitz. It is deterministic, assuming that the application of force will have certain predictable outcomes, and that overwhelming force will yield decisive movement. It encourages reductionist thinking. We break the war and the battlefield up into discrete, well-bounded compartments: operating systems and warfare areas; levels (strategic, operational and tactical), and instruments of power. It portrays belligerent nation-states as simplified spheres with a notional center of gravity which can be manipulated to move the enemy in the direction we desire. We need only identify and locate it, and there mass the effects of our overwhelming military power. Conversely, the inability to identify, locate, or mass effects at, the center of gravity leads to a protracted war of attrition, undesirable due to its cost in lives, time, and material.

But this is a way of thinking specific to ourselves and not necessarily the only, or best, way of considering war. It is time to consider the subject from our adversaries' perspective. The Eastern way of warfare, first set down by Sun Tzu and as modified by Mao Tse Tung, Ho Chi Minh, and Giap, casts military power in a much less dominating role: at most it should be considered the coup de grace for an enemy prepared for defeat by other means, or other instruments of power. The ideal, according to Sun Tzu, is to achieve one's strategic objectives without

resorting to combat. Given the current disparity between U.S. combat power and that of our potential adversaries, the Eastern school of thought is likely to attract new adherents.

Circumventing Action

It seems unreasonable to believe that adversaries will cease to exist. It seems equally unreasonable to believe that such adversaries will limit their ways and means of opposition to fit our vision of war, or our standards of appropriateness for the military instrument of power. Presently, we are the only military superpower. Why would our adversaries attack where they can generate the least relative advantage: at our greatest strength? Recognizing both our military strength and the implications of our force projection based strategy, potential adversaries can be expected to adopt strategies which attempt to circumvent both. They might design strategies based on the following spectrum of U.S. response; from most to least optimal: (1) avoid our military strength altogether, (2) stay below our threshold of force projection, (3) delay force projection long enough to make their action a fait accompli, (4) delay our force projection long enough to require a lengthy logistics buildup and politically daunting forced entry, (5) neutralize our use of military force, (6) avoid a decisive military engagement, and/or (7) cause us to desist from the use of military force.

History is replete with examples of circumventing action in military affairs: Kutusov against Napoleon, Washington against the British, and in World War II the U.S. Navy against the Japanese Navy prior to Midway. In the aftermath of Pearl Harbor, initial U.S. naval strategy in the Pacific emphasized avoiding a decisive naval defeat rather than inflicting one on the Japanese.¹⁸ The common thread, obviously, is the avoidance of decisive and probably disastrous engagement by the weaker side. But circumventing action also included other than military instruments of power. Japan's preemptive strike on Pearl Harbor was

designed to neutralize our military options. Once the U.S. Pacific Fleet was destroyed, the Japanese felt they could employ diplomacy to dissuade the U.S. from further challenging them militarily. Even if this was not permanent, the U.S. recovery would take so long as to call into question the feasibility of attacking fortified Japanese positions. Hitler, too, sought first to neutralize the British through diplomacy; when that failed, he turned to Operation Sea Lion.

This type of circumventing action is not a new phenomenon. On the contrary, it has existed longer than man. It is the concept contained in the phrase "path of least resistance." It is the idea that, faced with an obstacle or a threat possessing overwhelming strength, nature, people, or organizations will select a series of actions that mitigate or minimize the relative strength of the obstacle or threat. In nature and sociology, circumventing action is an agent for survival through change, the alternative for those facing Darwin's natural selection. In war and strategy, circumventing action is similarly an agent of change and survival, and perhaps most clearly articulated in Liddell Hart's strategy of indirect approach. In either case the choice must be made: adapt or fail. The stakes are tremendous: failure means death.

While much of this seems obvious, the point is that power historically exists in various forms useful for those who would exploit it. From the perspective of our adversaries it is apparent that something new is required to circumvent U.S. military might. New opportunities for the acquisition of power occur when advancing technology and changes in society combine with innovative thinking. In their unrelenting search for greater relative power, those who would wage war will maximize these opportunities. This is a major premise of this thesis. Our adversaries will likely find their solutions where these opportunities meet their need for circumventing action. This view of the RMA--that it may provide greater opportunity for our adversaries than for ourselves--is admittedly unconventional. It is not, however, unjustified.

The Revolution in Military Affairs

Recognition that a technology driven revolution is occurring in societies around the world is nearly universal. Described as the Third Wave by the Tofflers in their bestseller of the same name, it is referred to more commonly as the Information Revolution, in reference to its predecessors, the Industrial and Agricultural Revolutions. A concurrent revolution in warfighting is the subject of much discussion within professional military and strategy circles. Sometimes referred to as simply a revolution, or, with pointed precision, as the military-technological revolution,¹⁹ it has more recently and frequently come to be known as the Revolution in Military Affairs, or RMA.

The Revolution in Military Affairs is a new term for what probably is also an old phenomena. As described by Metz and Kievit, RMA is dramatic and decisive change; permanent, fundamental and rapid:

The basic premise . . . is simple: throughout history, warfare usually developed in an evolutionary fashion, but occasionally ideas and inventions combined to propel dramatic and decisive change. This not only affected the application of military force, but often altered the geo-political balance in favor of those who mastered the new form of warfare. The stakes of military revolution are thus immense.²⁰

RMA is an application of catalysts, ideas and inventions, to a fertile environment.

Despite widespread disagreement on what in the past qualified as a revolution in military affairs, most agree that the exploitation of technology is central to its revolutionary quality. Technological innovations, inventions, spring from new ideas, trends, or societal needs and gain momentum from the advances of other recent innovations and their impact on society. This synergism, a catalytic combination that is greater than the sum of its parts, is the engine for the revolution, i.e. continued rapid growth and innovation. New tools fill the need to get something done in a better fashion and create new opportunities to do things that previously might not have been conceived. They confer power

on their owners. As often as not, those empowered by this engine of revolution were not the ones previously dominant.

An example of such an engine is the technology of metallurgy in the nineteenth century. The conversion of naval ships from wood to metal spawned a quest for more lethal guns. More lethal guns drove improvements in armor and a conversion from iron to steel. The lessons learned from this gun / armor cycle fed the development of a concurrent innovation, the steam propulsion plant, improving its efficiency to the point that steam could replace sail as the sole means of propulsion. Freed from the vagaries of the wind, ships could choose direct routes and attain higher average speeds. Greater mobility gave navies greater relevance because they could apply combat power more quickly in more places.²¹ When steam was coupled with advances in communications, another emerging technology, naval movements could be coordinated over vast distances. Forces could be rapidly concentrated at crucial places and times from widely dispersed locations.²² Indeed, Dewey's defeat of the Spanish fleet at Manila in 1898 is significant not because of its magnitude but because it occurred a mere six days after war was declared and halfway around the world from the belligerent nations. The mastery of space and time, the essence of military power, was unprecedented.

Strategic effects were just as decisive: overseas alliances were more important because combat and logistics assistance could be obtained more rapidly. Naval powers rose (U.S., Japan) and fell (Russia, Spain) as they embraced or ignored the new technologies, or as their relative advantage was altered by the choices of their adversaries. The worldwide geo-political balance was changed. Over the course of a few decades, naval warfare was permanently and fundamentally altered.

Technology and war are inextricably entwined because both are fundamentally about leverage. War is the application of irresistible, usually destructive, power to force one's enemy to do one's will. Technology is the use of tools to more effectively and efficiently apply

power. Weapons are the tools of war. The purpose of each is the achievement of greater leverage, or comparative advantage. Consequently, it is easy to consider the revolution in military affairs as a womb for weapons of greater effectiveness, efficiency and economy. But this view misses the point of the RMA: the rules of the game have changed.

A Different Game

The Gulf War is often noted as the beginning of the era of warfare ushered in by the current Revolution in Military Affairs. The comparative advantage achieved by the U.S. through the application of Information Age technology resulted in an unprecedented rout of the fourth largest military power in the world. But that assessment is predicated on a Western perspective. Not all concur.²³

In July 1992, the U.S. Navy was enforcing the United Nations Security Council resolutions applying economic sanctions against Iraq; intercepting merchant traffic bound to and from Aqaba, Jordan. With its few ports in the Persian Gulf unserviceable in the aftermath of the Gulf War, Iraq was believed to be using Aqaba to receive the bulk of its commercial cargo. Aqaba was ideally situated just off the heavily travelled sea lanes between the Suez Canal and the Straits of Bab-el-Mendeb, at the juncture of the Sinai and Saudi Peninsulas, and less than a days drive from the Iraqi border. Aqaba provided modern, high capacity cargo handling facilities and access to the world's shipping lanes in one of the very few nations publicly supporting Saddam Hussein. The U.S. Navy, joined intermittently by British, French, Canadian and Australian ships, was charged with ensuring that cargo bound to Iraq carried only foodstuffs or medical supplies. No Iraqi exports were allowed. These standards were maintained by inspecting the cargo holds and containers of merchants bound to or from Aqaba.

The merchants encountered by the Red Sea Maritime Interception Operations Task Group stationed south of the Straits of Tiran varied

greatly in size, shape and standards, but were of four basic types: bulk carriers, essentially several large warehouses surrounded by a hull into which potash or olive oil was poured; break bulk carriers, similar in design but likely to hold containerized cargo; RO / RO or roll on / roll off ships carrying literally thousands of cars and trucks; and container ships, designed to accept railroad boxcars up to forty feet in length directly from a train. Large container ships, carrying up to several hundred containers stacked three high, presented the greatest challenge to the crew of an intercepting warship.

As boarding officer in charge of a team of about fifteen, this author boarded one of these large container ships. The ship was clean and the crew, mostly Jordanian, were very cooperative, if somewhat cautious. The stacks of cargo manifests, bills of lading, and cargo plans (detailing who was shipping what to whom, and where it was stowed onboard) were already laid out on a chart table when we arrived in the pilothouse. They were well organized, and color-coded; although undoubtedly time-consuming the boarding would likely go smoothly.

In the course of the six hour inspection of cargo the Jordanian master of the vessel displayed customary Arab hospitality, offering light foods and drink. He was educated, well read, and spoke English fluently. He had previously sailed for a Kuwaiti company, but had been dismissed as a result of Iraq's invasion of Kuwait. His resentment showed. His views on the Gulf War were fascinating. He quietly but firmly insisted that Iraq had won the war. Although he acknowledged that Iraq had been driven from Kuwait, he maintained Saddam had succeeded in punishing the Kuwaitis for their liberalism and largesse, had demonstrated it was possible to defy the West, and was still a force to reckoned with in the region. The captain further maintained that Saddam's popularity was far greater and more enduring than we imagined, and that, through a miracle in the desert, Saddam had been allowed to retain the bulk of his military might. Upon debarking the ship several hours later, I felt that I'd been through the

Looking Glass: how could an otherwise rational individual draw such absurd conclusions about a relatively straightforward application of military power?

An answer may be provided in a passage from Lester Thurow's Head to Head: the coming economic battle among Japan, Europe and America.

Thurow uses a metaphor to describe the profound impact of the different perspectives Germany, Japan and America bring to economic competition:

very different histories have led to very different systems, today those very different systems face off in the same world economy. Let me suggest that the military metaphors so widely used be replaced by the language of football . . . Everyone has to agree on the rules of the game, the referees, and how to split the proceeds . . . But what the rest of the world knows as football is known in America as soccer. What Americans like about American football - frequent time-outs, lots of huddles, unlimited substitutions - is not found in world football. It has no time-outs, no huddles and very limited substitutions. It is a faster game. So too is the economic game ahead. All sides will call themselves capitalists, but the participants will be playing two very different games.²⁴

If the Jordanian captain can be thought of as something other than a misguided dupe of propaganda, perhaps his analysis has some validity and Saddam was playing a very different game than the U.S. conceived. By our standards success was achieved: Kuwait is free, Saudi Arabia is no longer threatened, the flow of oil continues unimpeded, and peace initiatives are changing the political geography of the Middle East. On the other hand, if Saddam's objectives were not limited to, or devolved from, the retention of Kuwait, he might claim success. He has outlasted his nemesis George Bush, continues to successfully defy the West, retains significant combat power and can still credibly threaten to punish in Allah's name. His power to manipulate the West certainly continues, as evidenced by our recent unplanned deployment of thousands of troops to the region. Does anyone claim to fully understand Saddam's goals?

If Saddam can employ his only significant instrument of power, his military, in a manner not credible or transparent to U.S. strategists, perhaps others can similarly employ their instruments of power. In Rising Sun, Michael Crichton portrays aggressive Japanese business practices as

economic warfare; brutal, amoral, efficiency driven, and certainly not without casualties. Crichton's vision brings to mind Sherman's description of war as power unrestrained.²⁵ Although it could be uncharitably described as playing equally upon fears of yellow peril, big brother and dehumanizing technology, the novel is thought provoking because it postulates a war that substitutes economic weapons for combined arms, and a hostile strategy that presumes the U.S. would be unable to recognize the implied threat.

Perhaps because he is a scholar, Lester Thurow holds a more benign view, one of unpremeditated, but natural economic conflict. After the passage quoted above, Thurow describes how new process technologies, new institutions and a skilled work force will supersede the historical sources of economic strategic advantage. He theorizes, in so many words, that a revolution in economic affairs is occurring; that technology advances have permanently, profoundly and rapidly transformed worldwide economic competition into something new for which Germany and Japan are strategically better positioned. The reason they are better positioned is that, three to four decades ago, both chose to develop process technologies to avoid (circumvent) American dominance in product technologies.²⁶ Today, when mastery of process technologies confer tremendous comparative advantage, both Germany and Japan are, throughout each nation, organized and pre-disposed to fully exploit them in a fashion America and others cannot. But a theme of Thurow's book is that despite the lack of initial premeditation, the potential consequences are no less dire for America.

This revolution in economic affairs is, like the revolution in military affairs, a result of Information Age technology innovations that are changing society at its most basic level. Both revolutions are characterized by accessibility to tremendous leverage for those who master the technology. Both areas are recognized instruments of national power. A significant comparative advantage in an instrument of power would appear

to be, by definition, the means for one nation to compel another to do its will. Hostile use of both appears to be consistent with the intent of war. It seems reasonable to question the boundary that describes hostile application of one as war and hostile application of the other as merely conflict, or intense competition. It also seems reasonable to assume the same question is applicable to the recently articulated, and more vague, information instrument of national power.

A Different Perspective

Anticipating the future from this nexus of current events is a difficult thing. What seems significant may prove transitory, and what remains below the threshold of recognition may prove to have impact well out of proportion to its current significance. But policy makers must attempt to divine the future to fashion effective and economical long term policies. This is particularly true now for the military. The challenge, however, is to identify the significant issues, trends and developments that will affect the military profession in the future, and meet historian Michael Howard's oft quoted standard; i.e. "get it just about right."

"It," of course, is to be ready--or not fatally un-ready--to meet and defeat whatever capabilities our future enemies may employ. To anticipate these future strategies, this thesis uses the adversary's perspective; as in "How might our adversaries wage war against the United States?" An adversary could reasonably be expected to attempt circumvent U.S. strengths, and at least consider, if not employ, any and all opportunities to exploit U.S. vulnerabilities to achieve its goals. Free from American cultural and conceptual biases and restraints, the opportunistic and need-driven nature of the adversary perspective should more readily highlight how war may change in concert with society and the tools of society, technology. By contrast, as the only military superpower, America is less likely to embrace concepts that refute or simply do not correlate with traditional views of military supremacy.

The mere fact of America's military dominance is more than sufficient motivation for potential adversaries to circumvent it. Their search for alternatives will take place in the sweeping changes occurring in society and technology today. For, if war is using force to compel a nation to do another's bidding, then, historically, the force used has been the leverage of applied technology. It follows, then, that a revolution in technology and society will cause a fundamental change in the nature of war. As is frequently noted, change and opportunity are one.

This thesis will use the adversary's perspective to anticipate the complementary course of the phenomena of circumventing action and the revolution in military affairs. The adversary's perspective is a useful device to reduce initial assumptions and related biases, and foster unconstrained thinking about the future. The occurrence of war between America, and Germany or Japan, for instance, may be exceedingly unlikely. But it is not unthinkable, and considering it is expected to be illuminating. For instance, if either were to desire it, how would they wage war against the U.S., given the restricted development of their military forces? What is the relative value of a large comparative advantage in one instrument of power compared to another? When does exploitation of such a comparative advantage constitute war? How is it recognized? Is malice of forethought or intent required; or are the effects sufficient? Is the military a force of last resort or merely one of several options to pursue policy by other means? The definition of war may need to be broadened; and if it does, so too will the terms weapon, target, decisive point, center of gravity, and battlefield.

The primary question is, then, how might an adversary wage war on the U.S.? To answer this requires first an understanding of why different and new thinking about war is possible. Two related questions, distinct but inseparable, are "what are the technological developments with a potential for hostile application?" and "what aspects of our society

(static and dynamic) can be attacked with these technologies?" Using themes and concepts from a wide variety of sources considered in the literature review (Chapter Two), Chapter Three develops a theoretical framework on which to base the answers to those questions . . . using something other than mere conjecture. Through the use of fictional scenarios designed along the organizing concepts of the previous chapter, Chapter Four considers other questions about the nature of war in the future, such as: is a computer virus a weapon of mass destruction in an information based society? Are coordinated campaigns employing these revolutionary technological developments in a destructive fashion any less a war if it is not recognized as such? Chapter Five considers the consequences and implications of the theory and the scenarios.

Anticipating the future from current events is a difficult thing. The question remains, however, how does one identify the significant issues, trends and developments that will affect the military profession in the future? This thesis considers the problem analogous to that of the homicide detective who compares motives, means and opportunities to find likely suspects and gather confirming or refuting evidence. In this thesis, the crime scene is the context of changing society and technology. The suspects are sovereign nations and other groups. The circumventing action is the motive, and RMA but some of the means. Opportunity is the surprise inherent in the unanticipated use of technology and new concepts. Like the detective, this thesis seeks only a preponderance of evidence and a good fit. The burden of proof beyond a reasonable doubt will be left to others.

Endnotes

¹Carl Von Clausewitz, On War, ed. and trans. Michael Howard and Peter Paret, (Princeton, Princeton University Press, 1976), 75.

²Carl Von Clausewitz, On War, trans. O. J. Matthjis Jollis (New York, 1943): 18, quoted in Theodore Ropp, War in the Modern World, (Durham, Duke University Press, 1960), xv.

³Clausewitz, On War, ed. and trans. Howard and Paret, 89.

⁴Paul Seabury and Anthony Codevilla, War: Ends and Means, (New York, Basic Books, Inc., 1989), 18.

⁵Ibid.

⁶John Keegan, History of Warfare, (New York, Alfred A. Knopf, 1993), 3.

⁷Russell F. Weigley, The American Way of War, (Bloomington, Indiana University Press, 1973), 477.

⁸Walter Millis, Arms and Men, quoted by John M. Gates, "The Pacification of the Philippines, 1898-1902," The American Military and the Far East: Proceedings of the Ninth Military History Symposium, United States Air Force Academy, 1-3 October 1980. ed Joe C. Dixon (Washington, DC, United States Air Force Academy and Office of Air Force History, Headquarters USAF, 1980), 91.

⁹Ibid. Gates continues: "Since . . . 1956 there have been many wars but few with truly decisive outcomes." See also General Sir Frank Kitson, Warfare as a Whole, (London, Faber and Faber, Ltd., 1987), 10-11: "forces exist in the nuclear age mainly for the purpose of gaining time for negotiation rather than to win wars. . . ." and "the existence of nuclear weapons makes it too dangerous for the major powers to confront each other at all, and often prevents non-nuclear powers from fighting to a finish with conventional weapons. . . ."

¹⁰Keegan, xi.

¹¹James R. Arnold, Tet Offensive 1968, Turning Point in Vietnam, ed. David G. Chandler, Osprey Military Campaign Series 4, (London, Osprey Press, 1990), 6.

¹²"we should on all Occasions avoid a general Action, or put anything to the Risque, unless compelled by a necessity, into which we ought never be drawn." Quoted by Weigley, 3.

¹³Weigley, xxii.

¹⁴Arnold, 86.

¹⁵Jonathan M. House, Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization, (Ft Leavenworth, Combat Studies Institute, U.S. Army Command and General Staff College, 1984), 44.

¹⁶A. J. Bacevich, "Preserving the Well-Bred Horse," The National Interest, 37, Fall 1994, 48.

¹⁷Ibid., 44.

¹⁸See Samuel Elliott Morrison "For, reasoned the Cincpac staff,... 'inflicting damage on your enemy is no compensation for being sunk yourself;" in History of United States Naval Operations in World War II; Volume IV: Coral Sea, Midway and Submarine Actions, (Little, Brown and Company, Boston, 1949), 60.

¹⁹Jeffrey R. Cooper, Another View of the Revolution in Military Affairs, (Carlisle Barracks, PA, Strategic Studies Institute, U.S. Army War College, 1994), 40. In his endnotes, Cooper explains that MTR was the term commonly used when exploration of the subject first began but, recognizing that the term placed too great an emphasis on technology, much of the interested community now uses the term RMA. See also Andrew F. Krepinevich, Jr, "Keeping Pace with the Military-Technological Revolution," Issues in Science and Technology, (10/4, Summer, 1994).

²⁰Steven Metz and James Kievit, The Revolution in Military Affairs and Conflict Short of War, (Carlisle Barracks, Pa., Strategic Studies Institute, U.S. Army War College, July, 1994), 1.

²¹Archer Jones, The Art of War in the Western World, (Oxford, Oxford University Press, 1987), 423-425.

²²Today, in its capstone doctrinal publication, FM 100-5 Operations, the Army refers to these extremes of force concentration as mass and economy of force, two fundamental principles of war; the ability to rapidly shift between them is called agility.

²³E.G. Krepinevich, "Keeping Pace with the Military-Technological Revolution," 24. Also, as previously noted, John Keegan, A History of Warfare, (New York, Alfred A. Knopf, 1993), xi, calling it a Clausewitzian victory. Finally, Alvin and Heidi Toffler, War and Anti-War: Survival at the Dawn of the 21st Century, (Boston, Little, Brown and Company, 1993), 66. The Tofflers describe it as a dual war possessing both the embryonic elements of the next form of war and standard elements of the most common form of war.

²⁴Lester Thurow, Head to Head: the coming economic battle among Japan, Europe and America, (New York, Warner Books, 1991), 39.

²⁵Weigley, 152.

²⁶Thurow, 39-46.

CHAPTER TWO

LITERATURE REVIEW

A major premise of this thesis is that the context in which the revolution in military affairs takes place is critically important to its analysis. Consequently, the literature review includes a wide variety of sources, from equally diverse disciplines. There is scholarly precedent for a broad, multi disciplinary approach. In his preface to the second edition of Patterns of War Since the Eighteenth Century, Larry Addington credits noted historian Theodore Ropp for persuasively stating that "war is best studied as a process of change in its socio-political, technological and organizational aspects." Addington employs this approach to present a "synthesis of the many changes of war" in the context of the "patterns peculiar to each age." To this end, he devotes a chapter to each age, using the similarities and differences of the previous age to highlight war's evolution. As might be expected, his explanations frequently leave strictly military topics to seek causal relationships in the economics, politics and technology of the day. A multi-disciplinary approach is not only an accepted approach but warranted by the nature of the subject.

The differing opinions about the RMA is another reason to emphasize scope over depth. The discussion about the RMA has been likened, by more than one writer, to the story of the blind men and the elephant. As each man touches the elephant's tail, tusk, ear, side, etc., he precisely describes it as a snake, spear, leaf, wall. . . . None comprehend the true nature of the beast. So, too, it seems with those writing about the revolution in military affairs. The literature review sought different perspectives in the hopes that, together, they might

provide a more descriptive picture. Themes that recur in the literature are that change in any discipline is both a physical and intellectual process, and that power is largely dependent on its context and target. Both themes figure prominently in the new perspective on the revolution in military affairs presented later.

As indicated above, much has recently been written on the Information Revolution, military technological revolution and the revolution in military affairs. This thesis owes much of its impetus and organization to two articles: "Keeping Pace with the Military-Technological Revolution" by Andrew F. Krepinevich, Jr., and "Revolutions in Military Affairs" by James R. FitzSimonds and Jan M. van Tol; the primary question and two of the secondary questions are suggested by the authors in the latter article.¹ The willingness to ascribe non-traditional methods of war to a potential adversary is fundamental to Grant T. Hammond's article "Paradoxes of War."² T. A. Heppenheimer's article for American Heritage magazine "Build-Down" provides an excellent overview of America's cycles of demobilization, and the interaction of societal, technological, and political changes in American and recent international military history.³

The attitude of this thesis is best captured by the article by A. J. Bacevich entitled "Preserving the Well-Bred Horse." The title refers to the previously quoted predictions by British Field Marshall Sir Douglas Haig, who said that, in future wars, airplanes and armor would be used only as accessories to man and horse.⁴ That he said this in 1925 as the German military began to develop what became Blitzkrieg is entirely to the point. Bacevich accuses today's military intellectuals of similarly arriving at "relentlessly conventional" conclusions despite recognizing that the very nature of war is changing. Carrying on in Haig's tradition, they are simply advocating a better bred horse: armies augmented with new technology. Landpower, remains for them, "the ultimate application of military power."⁵

Bacevich believes they are looking to the revolution in military affairs to provide a force better suited to solve the two most vexing problems of modern warfare: nuclear warfare and low intensity conflict. He states

Although it liked to pretend otherwise, the Army . . . never solved the problem of how to fight on a nuclear battlefield. . . . As the Vietnam War demonstrated with conspicuous clarity, the preferred American style of waging war was (and remains today) ill-suited for such [low intensity] conflicts. . . . As interpreted by the services, the underlying aim of today's so-called revolution in military affairs is to declare null and void the problems posed by these two earlier revolutions.⁶

He notes that the preferred American style of warfare "requires adversaries who share the American view of how real war is henceforth to be conducted,"⁷ and questions the presumption that they will. It is a line of thinking entirely consistent with this thesis. So too is his belief that it is dangerously misleading to assess the impact of the RMA in isolation from other sources of change.⁸

Explaining these other sources of change--visible in the interaction between society and technology--is the forte of Alvin and Heidi Toffler. FutureShock, Powershift and The Third Wave are their chronicles of the gradual recognition and ongoing analysis of first the effects and subsequently the causes of the dramatic changes driven by information technology. Powershift is particularly relevant because, in it, the Tofflers explain that there are three basic forms of power in any society: knowledge, wealth and violence. They also present a convincing argument that the ideas and technological innovations that comprise the Information Revolution are transforming the way power is acquired and used. The most important transformation is what they describe as the democratic redistribution of power from large organizations to individuals. The transformation of power, particularly the empowerment of individuals is their "powershift." This thesis extends that line of reasoning to warfare.

War and Anti-War is almost a sequel to their previous trilogy, focusing on anticipating changes to war and peace-keeping (peace-making) requirements. Significantly, War and Anti-War arose out of discussions the Tofflers had with an Army officer tasked to staff the concept.⁹ Not surprisingly, it provides some of the most thought provoking analysis of the subject.

The Revolution in Military Affairs is the currently popular phrase assigned to the dynamic changes in how war can be fought. Although some disagree,¹⁰ RMA seems to be more effect than cause, the product of fundamental changes in society and technology. This is the central premise of the Tofflers in War and Anti-War. Although advertised as a departure from their previous work, War and Anti-War is consistent in style, concept and methodology.¹¹ As before, the Tofflers weave current events, interviews of acknowledged experts, sociology, politics, economics and history to postulate a synthesis of trends and likely developments. Their success--international bestsellers, acclaim, and prizes, and continued access to leaders in every discipline--may be the best indicators of their competence and credibility. But it is two of their themes in War and Anti-War--the dominance of knowledge superiority and the civilianization of war--that indicate RMA should be considered the effects of a larger system process.

The Tofflers claim that knowledge superiority is the new key to national survival. Unlike traditional military, economic, or past technology leads, however, knowledge superiority is exceedingly fragile; harder to hold than quicksilver, because it is a fundamentally different resource. Knowledge is inexhaustible. It can be used by both sides simultaneously. And small inputs can have disproportionately large effects, providing an immense (and presumably immediate) shift of tactical or strategic advantage.¹² They do not claim that these inputs must be traditionally military in nature. Indeed, their concept of "civilianization of war" supports the opposite conclusion.

To the Tofflers, the civilianization of war is the irony filled counter-process of downsizing the defense industry. As defense industries restructure for survival, many attempt to find civilian oriented applications for their formerly military specific products and/or services. As they succeed and develop goods and services for new markets, these industries transfer technology and know-how that have lost none of their potential for war giving "fearsome military capabilities to some of the smallest, poorest, and worst governed nations on earth. Not to mention the nastiest of social movements."¹³ Worse yet, the growing trend toward diversification and customization "translates into a far greater diversity of weapons," while greater communication (of goods, services, people and knowledge) puts these diverse weapons within the reach of all manner of organizations and individuals.¹⁴ While reaping the peace dividend, we are sowing the whirlwind.

The fundamental concept of War and Anti-War is that we make war in the same way that we make wealth. In part one, "Conflict," the Tofflers convincingly argue that, since methods of wealth generation are used to differentiate civilizations¹⁵, methods of wealth generation should also be useful to differentiate between their respective methods of warfare. And by extension, if a current wave of change is sweeping across the globe, then the resulting new form of civilization will bring with it a new form of warfare. This new wave is the Third Wave, in which information is both the primary resource and principle of organization. Part one concludes with the "Clash of Civilizations" that casts past wars as part of a master conflict between powerful First Wave and Second Wave interests within and between countries, responsible for the industrialists prevailing within their countries, and the industrialized countries dominating the world. It casts current and future wars as part of the same master conflict, this time resulting from the tensions between the rising Third Wave interests and the two older forms of civilization.

Part two of War and Anti-War, called "Trajectory," is devoted to tracing both the evolution and the revolution of the past warforms. Significantly, they tackle the issue of revolutions in warfare up front, stating that the term has frequently been applied too generously to what were simply profound changes or sub-revolutions.

[These] basically add new elements or create new combinations of old elements within an existing 'game.' A true revolution goes beyond that to change the game itself, including its rules, its equipment, the size and organization of the 'teams,' their training, doctrine, tactics, and just about everything else. It does this not in one 'team,' but in many simultaneously. Even more important, it changes the relationship of the game to society itself. By this demanding measure, true military revolutions have occurred only twice before in history, and there are strong reasons to believe that the third revolution - the one now beginning - will be the deepest of all.¹⁶

"Trajectory" proceeds to describe how each Wave's revolution shaped a particular form of war. The First Wave, the agricultural revolution, allowed communities to produce an economic surplus worth fighting over and hastened the development of the state. Generally true to its societal context, First Wave warfare was tied to the land and its seasonal cycle. Second Wave warfare reflected the Industrial Revolution's defining feature: mass production. The characteristic of quantity shaped both the execution and thought of war, up to and including weapons of mass destruction. Third Wave warfare, reliant on information derived precision rather than quantity, made its appearance in the Gulf War.

The Tofflers' work speaks to several issues and themes of this thesis. Like John Keegan,¹⁷ they see warfare as a derivative of society. Their distinction between evolutionary and revolutionary changes in warfare is instructive. They provide the most clear articulation of the characteristics of future warfare and how to determine those characteristics. Finally, the wide scope of their approach seems to be an appropriate precedent.

Stephen Peter Rosen's book, Winning the Next War is similarly focused on future warfare, but is less broad and oriented more toward innovation and resistance within military organizations. Referenced by

many who write about RMA, he provides several illuminating case studies detailing consequences of innovation or the lack thereof. His assertion that technological change must be accompanied by doctrinal and organizational change is widely accepted.

"Cavalry to Computer: The Pattern of Military Revolution" by Andrew F. Krepinevich, Jr. picks up where Rosen's work leaves off. Krepinevich states that military revolutions comprise not only technological, operational, and organizational change, but also systems development. From that foundation, he describes ten examples and from them extracts seven lessons about their nature. Although the more stringent Tofflerian definition of RMA seems more appropriate to current circumstances than Krepinevich's, his lessons are, for the most part, consistent with War and Anti-War.

Krepinevich's article "Keeping Pace with the Military-Technological Revolution" provides a strategist's take on RMA. Citing a parallel revolutionary shift in the international security environment, Krepinevich is dissatisfied with current thinking on the subject:

the Bottom-Up Review is mired in thinking of the past. It focuses most of its efforts on preparing to refight what retired General Colin Powell has called "the Cold War battle that didn't come" instead of analyzing how U.S. defense posture could be re-oriented to address future security challenges.¹⁸

His work makes a case for linkage between RMA and strategic thought:

Exploiting this military-technological revolution should be an integral part of the Pentagon's long-term strategic planning process. Stimulated by the accelerating rate of global technological change, military-technological revolutions are taking place with increasing frequency. Because they radically change the nature of military competition in peace and war, they have profound consequences for global and regional military balances. And because military-technological revolutions can occur in relatively short periods of time, they often lead to the unexpected and seemingly rapid decline of dominant military organizations that could not or would not adapt to the changing environment.¹⁹

Although not particularly detailed, this article is important because of his concern with strategic implications and synthesis of the many other issues involved.

In The Transformation of War Martin van Creveld takes the newspaper editor's approach, addressing the "who, what, why, when and how" of war. In his view, low intensity conflicts are the predominant form of contemporary warfare and the military superpowers have neither the weapons, organizations, or theory to properly conduct it.

My basic postulate is that, already today, the most powerful modern forces are largely irrelevant to modern war - indeed that their relevance stands in inverse proportion to their modernity. If this is correct, then the reasons must be sought on the conceptual level represented by modern strategic thought.²⁰

Consequently, van Creveld sets out to develop a new, non-Clausewitzian framework for thinking about war.²¹ By turns agreeing and disagreeing with his contemporaries on the direction war is taking, he provides an important counterpoint, in addition to a potential model for predicting our adversaries actions.

The authors of War: Ends and Means seek not to develop a new theory of war but to educate "a generation of Americans that has come to think of peace as its birthright . . . [and] whom the absence of the military draft has trained to live as if military matters were a spectator sport."²² It is expressly not written for strategic theorists, military professionals, or historians. This is well for there are some tremendously oversimplified lessons drawn from specific military events and capabilities.

As an example, the authors claim that

despite the fact that sea-skimming cruise missiles give ships only a few seconds warning, nowadays radar-controlled Gatling guns can put up a wall of bullets that will stop the cruise missile a few hundred yards from the ship. This can put conventionally armed, antiship cruise missiles out of business. Only if the cruise missile is carrying a nuclear explosive will it stand a chance of having any effect at all.²³

As sailors from the USS STARK and HMS ANTELOPE can attest, this is not true. Both ships were armed with the equivalent of the close in weapon system to which the authors refer, in addition to other anti-ship missile defense systems. Both ships were put out of action by conventionally armed cruise missiles.

Similarly, Israel's victory on the Golan Heights during the 1973 Yom Kippur War is reduced to a battle of attrition achieved through superior knowledge of terrain.²⁴ No mention is made of the Israeli's decision to counterattack, with inferior numbers, on the Syrian's flank. The Tofflers provide a better account and identify the pertinent lesson.²⁵

But away from the specifics of military capabilities and military history, the authors do provide some gems. Regarding the use of new technology:

time is perhaps the most crucial element in technical innovation. *The longer an idea takes to reach the battlefield as hardware, the shorter will be its period of usefulness.* Moreover, the contemporary American practice of delaying innovations in order to make them better, more reliable, and able to defeat countermeasures that do not yet exist is doubly foolish because it deprives operating forces of new technology until it is no longer new.²⁶ (their emphasis)

Noting in the "third world" media the frequent portrayal of America as the archvillain responsible for whatever real or imaginary ills are present, and our frequent association with the local enemy as a catalyst of hate, the authors state: "there is no shortage in the world of people who lack only the opportunity to wage war against the United States."²⁷

The aspect of War: Ends and Means most relevant to this thesis, however, is their assessment of our unique perspective on war:

Only when what came to be known as Western or Judeo-Christian civilization gradually accepted that, as one formulation put it, all men are created equal did this civilization come to deem armed hostility a departure from the normal state of peace, a departure that only good reasons could render legitimate. For St. Augustine and for the entire Christian tradition that has followed, the primary purpose of government is the maintenance of peace. The classic Christian title for the ruler is *Defensor Pacis*, the defender of the peace. The Christian tradition approves of war under a variety of circumstances. But it leaves no doubt that war is an aberration to be justified in detail, contrary to a standing presumption in favor of peace. Hence Western literature has always been full of people agonizing over the moral claims of waging war or making peace. Surely no traditional Chinese or Indian manual of statecraft ever agonized over the legitimacy - as opposed to the prudence - of attacking a neighboring principality or of oppressing foreigners. Thus, peace, the kind characterized by people treating each other more or less as they would like to be treated, is the peculiar and hard-won creature of Western minds. . . . This line of reasoning is shared by no other tradition. Our nearest intellectual neighbor, the Muslim tradition, though it recognizes the brotherhood of all men under God, defines peace as the

state proper *only among the Umma*, the believers in Islam. Nonbelievers, by definition, live in *Dar al Harb* - literally, the place of war. It is proper for Muslims to cut back this realm by the sword.

The bulk of mankind, though, lives under neither the Christian nor the Islamic tradition.²⁸

This provides insight into why we often fail to understand our adversaries.

The relationship between weapons, war, strategy and policy is the subject of Weapons Don't Make War, by Colin S. Gray. Presented as an inquiry designed to help explain the structure of the problem without advocating a specific solution, Gray nonetheless challenges much conventional thought. Weapons, he says, (in particular nuclear weapons) retain a "subordinate but two way relationship" with strategy and national policy.²⁹ Challenging the common categorizations of weapons, Gray states:

To be specific, no forces of any technical kind are inherently strategic, and whether or not particular forces are offensive is a matter of policy and strategy determination. It is unsound to judge "strategic quality according to geography (range) or quantity or quality of lethal effect (nuclear / non-nuclear). . . . to think of a weapon as inherently "strategic is to confuse instrument with effect. Similarly, habitually to call weapons offensive or defensive invites a blurring of critical tactical, operational, strategic, and policy distinctions.³⁰

Considering the possibility of technological surprise, a highly probable effect of the intersection of the current RMA and circumventing action, Gray also states: "The key to temporary success in war tends to lie in the novel use of new, or newly combined, weapons rather than in those weapons themselves."³¹

Providing some opinions that may be useful in answering the primary question, he covers, broadly, the historical tendencies of the Japanese (operational over-complexity); Germans (cultural inability to function effectively at the strategic level of conflict); and Americans (undue machine-mindedness).³² He ends on a note that indicates how his views may provide evidence for or against a thesis that proposes that technological development and societal change create potentially unimagined opportunities to use new weapons in novel ways: "weapons do

not make war, and their control or elimination does not make peace. War and peace are a political subject."³³

Modern Arms and Free Men, by Vannevar Bush, provides a neat historical counterpoint to Weapons Don't Make War. Bush, too, is concerned with the relationship between weapons, war and policy. Similar to his counterparts today, he notes rapid changes to both the nature and context of these relationships; changes in which he has had a hand: he has "specialized in the development of new weapons and wrestled with . . . problems of total war."³⁴

But his perspective is that of one who has let the genie out of its bottle and now must remain its master. In his foreword he notes that the President's announcement of an atomic explosion in the Soviet Union appeared as the book went to press.

Set in the context of the dawn of the Cold War, Modern Arms and Free Men reflects the values and expectations of the time, and perhaps our first real national awareness of the amoral nature of the gifts of applied science, and of a conscience that would pause to consider their implications. He also writes of the growing recognition of what Krepinevich now calls the Nuclear (military) Revolution. Put in stark contrast by their displacement of half a century, his assessments and appeals to virtue come off as quaint, nostalgic, even naive. Some examples:

- the technological future is far less dreadful and frightening than many of us have been led to believe . . . the democratic process is itself an asset with which, if we can find the enthusiasm and the skill to use it and the faith to make it strong, we can build a world in which all men can live in prosperity and peace.³⁵

- There need be no more great wars yet there may be. If democracy enhances its latent strengths, and free men join in a common purpose resisting the temptations of avarice and the diversion of petty causes, they can prevent great wars.³⁶

- We do not elect a president because he understands atomic energy in all its ramifications; we know and he knows that he does not.³⁷

- A great war would not end the progress of civilization, even in the days of the riven atom . . . It is even possible that defense may be tightened, not made absolute, but competent to stop the full flood of death from the air.³⁸

One wonders what Bush would have thought about MIRVs, MAD and ABM treaties, Chernobyl, Three Mile Island, Bhopal, smog, ozone depletion, Love Canal, cocaine, crack, designer drugs, drive by shootings involving kids with automatic weapons, or any of a dozen other technology enabled ills we've become virtually inured to. Or far that matter, of a nuclear power trained president (Carter, as some point out with ironic purpose), and high school and undergraduate physics texts, even open press publications, providing sufficient information to construct a rudimentary nuclear bomb.³⁹

Yet, Bush mostly suffers from the accuracy of our hindsight. Above is the conception of the Strategic Defense Initiative. His assessment of the impact applied science, or technology, had on all facets of warfare is at least as accurate as our hindsight. Like commentators today, he notes that "there is chance and change, a great war may come in ways we do not see;"⁴⁰ and that "the application of science . . . renders wars more swift and more rapidly destructive."⁴¹

Explaining, he notes that

This [is] a result of the application of science to war in a degree that has completely altered warfare. The combination of science, engineering, industry, and organization during the last decade created a new framework that rendered conventional military practice obsolete. Radar, jet aircraft, guided missiles, atomic bombs, and proximity fuzes appeared while we were fighting; they determined the outcome of battles and campaigns even though their determining nature was not fully exploited in that contest. Over the horizon now loom radiological and biological warfare, new kinds of ships and planes, an utterly new concept of what might be the result if great nations flew at each other's throats.⁴²

But his greatest contribution may simply be that of an example of a well placed American publicly recording his thoughts on what he may well have considered an RMA had he been familiar with the term. When coupled with the trend of transnationalism, or the introduction of authorities in forms other than traditional nation state delineations, there is little

substantive difference between the Tofflers' chaotic Third Wave double-edged vision of civilianization and Bush's view of the manner in which pertinent technological innovation occurs: "As science goes forward it distributes its uses both to those who would destroy and those who preserve. . . ." ⁴³ Technology is neither inherently good nor bad (or, as per Gray: weapons do not make war), but is easily made so:

Pure science may go its own way, if it is allowed to do so, exploring the unknown with no other thought than to expand the boundaries of fundamental knowledge. But applied science, the intricate process by which new knowledge becomes utilized by the forces of engineering and industry, pursues the path pointed out to it by authority. ⁴⁴

Addressing the similarities and differences between the views of current observers and those of former observers and the accuracy of their predictions may yield clues to what is significant or trivial, cause or effect, evolution or revolution.

In Warfare as a Whole, Frank Kitson provides a British perspective on how technology, and nuclear weapons in particular, have changed the ways in which wars are likely to be fought; which he believes is not fully appreciated. Comparing the period since World War II with the one separating Waterloo from the Crimea, Kitson states:

the technological development of weapons and equipment that has taken place in that time, including the introduction of nuclear weapons and the use of space for military purposes, represents an even more fundamental advance in man's capability to wage war than the introduction of the stirrup and the introduction of gunpowder added together. ⁴⁵

Like many military professionals, he is skeptical of his organization's ability to keep pace:

It would not be surprising to find that the full implications of the developments that have taken place in the ways of waging war have not always been fully reflected in the way in which the army has prepared for its likely future tasks. ⁴⁶

The British preference to address different sorts of war entirely separately is, to Kitson, the primary culprit for this lack of preparedness:

War can best be defined as the use of force in pursuit of a nations interests, or, in the case of internal strife, in pursuit of the interests of a group within a nation. War can manifest itself in many

different forms some of which are hardly recognizable as such, but they all have to be considered when a country's defence policy is being formulated.⁴⁷

Invoking Mao's dictum that guerilla operations must not be considered as an independent form of warfare, but simply one step in the total war; Kitson identifies a systemic problem with western thinking on war:

This idea of warfare being a whole recurs frequently in the writings of foreign exponents of the art, but has not been accepted very readily by the British who prefer to regard the different sorts of war; e.g. limited war, or general war or insurgency as being entirely separate. But unless warfare is seen as embracing all its various forms there will be a great temptation to avoid preparing for some of them altogether.⁴⁸

The temptation is great, he continues, because the threat is diverse and our resources are limited. While threat diversity is tied to the potential adversaries acceptance of "warfare as a whole," resourcing is connected with balancing the capability to fight one war against another.

To Kitson, warfare encompasses a broad spectrum that includes subversion on one end and "all out war" on the other. While acknowledging the existence of intermediate steps and overlaps in time and space, Kitson proposes a whole warfare framework that grows with the scope and complexity of the belligerents.

At the less intense end of the spectrum, subversion is illegal means short of the use of armed force. It is taken up by one section of the people of a country to either overthrow those governing the country or force them to do things which they do not want to do. This may involve the use of political and economic pressure, strikes, protest marches and propaganda; and include the use of violence against recalcitrant members of the populace to engender their support. Insurgency is what subversion becomes when armed force is used against the government on a significant scale⁴⁹ in addition to the methods already mentioned. Conventional war is conflict between two or more countries limited in either terms of

geography or of weapons. All out war is not limited in any way and in is war in which all weapons are used or likely to be used.

Since he suspects nuclear war being one of the forms of war eclipsing the resourcing of others, Kitson is interested in the impact nuclear capability has on warfare. He concluded that the existence of nuclear weapons forced at nuclear powers and non-nuclear powers alike to alter the way they waged war. In short, he says, nuclear weapons have completely altered the way in which war should be thought about and practiced.⁵⁰

Conventional wars between non-nuclear powers are no longer fought to a finish but fought to quickly strengthen negotiating positions, as in the Arab Israeli War, or the war between India and Pakistan. The prospect of mutual destruction made direct confrontation between nuclear powers too dangerous, forcing them to the arena of insurgency wars and proxies.

Whilst the existence of nuclear weapons makes it too dangerous for the major powers to confront each other at all, and often prevents non-nuclear powers from fighting to a finish with conventional weapons, it is still possible for a country to pursue its interests by fostering insurgency in an enemy's country or at least by taking advantage of any discontent that may arise there.⁵¹

This allows plausible deniability to be maintained, potentially decoupling the nuclear capability from the fortunes of the conflict.

Although open to criticism due to its Cold War orientation, Kitson's work is relevant to this thesis on several counts. First, his interest in more broadly defining warfare provides a starting point for determining options open to a potential adversary. Second, his use of Mao and contrast of British thinking with "foreign exponents of the art" is consistent thematically, particularly since it highlights how different concepts of war tend to present exploitable vulnerabilities. Since we share common warfighting traditions and cultural heritages, a problem for the British would seem to be a problem for the Americans. Finally, his discussion of the impact of this half century's penultimate technology of destruction seems to make a case for the ubiquity of circumventing action.

Technology Change by Emmanuel Mesthene addresses our awareness of modern technology affecting society in important ways. Mesthene says this awareness is a function of three things: our improved understanding of nature and the consequences of science; our adeptness in the deliberateness of their use; and population growth.⁵² His argument is that technology is simply new tools. These new tools create new opportunities. To employ these tools people must organize themselves differently than in the past, which equates to social change. This reorganization means old goals are replaced (at the very least in priority) with new ones. This strains traditional values and beliefs, which creates conflict.⁵³ Although written two decades ago, Mesthene anticipates a point often used to "explain" why our adversaries can not easily exploit the RMA:

New technology creates new opportunities for men and society, and it also creates new problems for them. It has both positive and negative effects and it usually has the two at the same time and in virtue of each other.⁵⁴

He also addresses the key point of motivation to seize these opportunities:

A new invention or technological development - a new tool, in short - generally creates a new opportunity, either to do something differently or better than before, or to do something that simply was not possible at all before. Some previously distant aspiration may thus become converted into an achievable goal.⁵⁵

Mesthene's work provides the perspective of some of the earliest work on the subject of technological innovation.

Techno-Diplomacy is a period piece, written by Glenn E. Schweitzer as an argument to garner scientific and technological support for perestroika. As a long time participant in international diplomacy, Schweitzer makes some interesting observations regarding technology and power.

Science and technology can be equated with power - military power, economic power, environmental power, and the power of new ideas and hopes.

The concept of supremacy through military power lost much of its earlier significance shortly after the world entered the age. Longer ago both superpowers crossed the threshold of nuclear capacity to destroy civilizations, rendering additional weapons of little military value . . . clearly attempts to achieve military superiority should

become less of a driving force in the development of superpower relations.⁵⁶

Four years prior to the publication of War and Anti-War, he recognized the effects of what the Tofflers term "the civilianization of war" noting that with each passing day the distinction between science and technology for non-military uses and for military uses becomes less clear.⁵⁷

His recognition of the need for "techno-diplomacy"- the intentional transfer of scientific knowledge and applied science (technology)⁵⁸ is the application of the thesis of the Tofflers' Powershift: knowledge is a real form of power, and inequities in knowledge are mirrored in the balance of power. They are therefore threatening. The increasing relevance of this (information) instrument of power is what makes his work relevant to this investigation.

Force Without War also speaks to the relative strengths of the various instruments of power. It is a Brookings Institution study of the two hundred plus instances of the application of U.S. military power short of war since World War II. One reason for its inclusion here is what it reveals about American strategic options:

In all these situations, there is a risk that lesser military actions may lead to pressure for greater U.S. involvement.

The case studies bear this out: the Castro regime did not yield at the Bay of Pigs, Hanoi and the Viet Cong were not swayed in the early 1960s, and India dismembered Pakistan in 1971. In each case, either the U.S. suffered humiliation or the fear of exposure embarrassed decision makers into escalation and war.⁵⁹

Once the military instrument was committed in a show of force, no other instrument of power was sufficiently powerful to substitute; that is, apply equivalent pressure and provide decisionmakers an option other than escalation or humiliation. One wonders if the Tofflers or Schweitzer would concur today.

Another reason the study is included is that it indicates our most frequent means of recognizing or causing a threat to vital interests to be recognized is the use of military force. If Schweitzer is correct

about the decreasing relevance of the military instrument relative to a technological or informational instrument of power, our favorite method may be obsolete. Conversely, we may miss an important signal in a form we do not recognize.

Finally, the study is an example of a rigorous comparative analysis used to develop the appropriate questions for further study. This will be studied as potentially applicable to the methodology of this thesis.

Like Head to Head: the coming economic battle among Japan, Europe and America, The Coming War with Japan casts our current ally as a likely adversary. Unlike Head to Head, The Coming War with Japan builds a case for armed conflict. The authors are careful to make clear their motives: "This is most emphatically not an attack on Japan or an example of Japan bashing . . . both the U.S. and Japan are victims of forces they can neither control nor resist."⁶⁰ These forces are unavoidably competing economic interests brought to the forefront by the loss of the common strategic interest.

The common strategic interest was the containment of the Soviet Union. During the Cold War a perfect synergy between Japan's economic interests and America's political interests caused America to counter the intent of the post war constitution it had imposed on Japan; that is to remove permanently any possibility of future challenge from Japan. Japan became

so important to American strategic interests that America was willing to endure substantial discomfort from Japanese economic competition. Indeed, as Japan became an increasingly formidable economic power, the U.S. became increasingly dependent on it politically . . . its political importance to the U.S. forced America to cede to Japan substantial economic authority, far more than would be enjoyed by a nation that had surrendered unconditionally.⁶¹

Presumably, the same thesis holds for Germany.

Somewhat dating their work, the authors continue:

With glasnost, however, the equation shifts, for if the Soviet Union accepts its encirclement then the foundation of the U.S. - Japanese alliance dissolves . . . because the U.S. will no longer need to

endure Japanese economic encroachments, since the strategic payoffs . . . will cease to have meaning after the Cold War.⁶²

Most importantly to this thesis, the authors force one to look from the Japanese perspective:

it should be the starting point of all thinking in Japan on this matter that should the U.S. cease to view Japan as an important strategic asset, it would be free to base its relationship with Japan on economic considerations, all of which militate against friendly relations . . . From the Japanese point of view, the situation became dangerous once the U.S. stopped worrying about the Soviets. The Japanese find themselves in a position where their most important and resourceful economic adversary is the guarantor of their supply of raw materials. For the Japanese to accept this, they must accept the premise that the U.S. is not only infinitely generous but infinitely fair. Nothing in the Japanese experience teaches them this. Recalling the Nixon shock of 1973 when President Nixon unilaterally cut off supplies of soy beans to Japan in order to reduce the price of meat in the U.S., it can be seen that there is precedent for American interference in the vital interest of Japan.⁶³

The authors next make a case for how the situation today strongly parallels that of just prior to World War II; and how the attack on Pearl Harbor was an inevitable result of Japan's need to reduce the vulnerability of its sea lines of communications for imported raw materials.⁶⁴ Although tangential to the issue of how an adversary might wage war, the authors make a case for why such a war might occur.

An important source for this thesis are the monographs published by the U.S. Army War College Strategic Studies Institute. The most important have been The Revolution in Military Affairs and Conflict Short of War by Steven Metz and James Kievit; Another View on the Revolution in Military Affairs by Jeffrey Cooper; and The Revolution in Military Affairs: a Framework for Defense Planning by Michael J. Mazarr.

The Revolution in Military Affairs and Conflict Short of War, Metz and Kievit provide a working definition of RMA: permanent, fundamental and rapid change with the potential to affect not only the application of military power but the geo-political balance.⁶⁵ They address circumventing action: "as the Third World dictators assimilate the lessons of the Gulf War, they will see conflict short of war as a useful, but safer form of aggression."⁶⁶ They then present a pseudo history of the application of

RMA to conflict short of war, including throughout manners in which new technology may be applied against us.

In Another View on the Revolution in Military Affairs, Jeffrey Cooper argues that much discussion of RMA has been at best misdirected:

too much attention has been paid to identifying the key technologies for the RMA and too much time is still wasted on RMAs as technology-driven phenomena . . . far more emphasis than warranted has been placed on using RMA to defeat another heavily mechanized regional hegemon like Iraq (and Doing it better), rather than on preparing to address new challenges, including potential emerging competitors . . . RMAs are not merely more clever or even more elegant technological breakthroughs than are evolutionary military innovations; these revolutions are more profound in both their sources and implications . . . this RMA, fueled by the 'Information Revolution' may have potential for more sweeping and fundamental changes than most of its historical cousins.⁶⁷

Cooper provides the recent history of RMA and notes the current disagreement on the subject with regard to impact; historical context; maturity; character or definition and approach to implementation. Interestingly, he appears to disagree with what others have declared comprised revolutionary changes in the conduct of war: by his count four RMAs have occurred since the Napoleonic RMA.⁶⁸ Additionally, Cooper appears more ready than his predecessors to broaden the factors open to consideration when considering the impact of the current revolution.

In The Revolution in Military Affairs: a Framework for Defense Planning, Michael J. Mazarr concurs with Coopers' willingness to ascribe broader impact to this current revolution and cites War and Anti-War to explain military revolutions are the product of broad social and political transformation.⁶⁹ Mazarr makes a strong case for the unpredictability of politics in general and warfare in particular.⁷⁰ Extremely interesting are his references to the new science of chaos, chance and non-linearity. Given the historical relationship of Newtonian physics and the Industrial Revolution, he seems, intuitively, to be on the right track. His framework consists of four principles--information dominance, synergy (also known as jointness)⁷¹, disengagement (or distance)⁷², and

civilianization--with which we can plan our efforts. These principles may prove useful when trying to anticipate our adversaries options.

Margaret Wheatley's Leadership and the New Science provides an important connection between social change and intellectual change. Her idea that most disciplines of knowledge have been, and should be, greatly influenced by science plays a central role in the development of the new theoretical framework in Chapter Three. Wheatley borrows from the most modern sciences to explain why organizations are not working well. Wheatley believes that recent discoveries in science have broad implications for organization theory because they fundamentally alter our understanding of how the world works. Since war and strategies of war are developed by and aimed at organizations, and exist within the context of this re-described world, her work is relevant. Her work provides the basis for a new conceptual foundation.

Her thesis is simple yet profound. Isaac Newton, she says, provided us our understanding of how our world works. His description was so successful that it is ubiquitous; our subconscious and unconscious expectations and presumptions of daily life are founded in it. Our expectations of determinism, readily identified causal relationships, certainty, regularity and predictability; and our belief in the utility of reductionism and simplification all spring from Newton's world-view. But, says Wheatley, the most modern sciences are now showing Newton's description to be incomplete or inadequate in many important ways. These inadequacies show up in the form of paradoxes; things that quite literally don't make sense . . . according to the rules of the world as we understand it. In our organizations, for instance, greater and more sophisticated planning and effort most often result in less significant results. Progress comes not from these herculean exertions but from unexpected places, or as a result of surprises or serendipitous events that were not considered. "Managing change" is an oxymoron, with the

effect that management objectives are frequently reduced from success oriented goals to simple endurance of unpredictable, disruptive forces.

Since paradoxes forced scientists to give up long cherished theories for more complete ones, Wheatley proposes that organizational paradoxes require similar treatment. In fact, noting the preponderance of organizational theorists with hard science or engineering backgrounds, she believes that the advances in science must be reflected in organizational theory because organizational theory has always been purposely based on our understanding of science. A similar line of thinking seems appropriate for war and military organizations.

Wheatley's explanations of science are relatively brief, relying less on a complete treatment than the legitimacy of the experts she quotes. Thus, her argument is sometimes difficult to follow. Unless one understands Newton's laws of motion and rules of reasoning, for instance, it is a leap of faith to accept how dramatically they shape our world view. Since her argument is mostly inductive, this leap may be too far for some.

On the other hand, Wheatley superbly highlights many of the implications of the new sciences--quantum mechanics, chaos theory, and self organizing dissipative structures. In an important way, each describes a world profoundly different than that described by Newtonian physics. Quantum mechanics contradicts our expectations of certainty and objective measurement; chaos redefines equilibrium, stability, order, and cause and effect; and dissipative structures teach new lessons about change and self renewal. When applied to organizational theory, the aggregate should persuade planners and managers to reconsider their notions of organizational design, interaction, control and measures of effectiveness. By extension, the same applies to parallel aspects of war or revolutions in military affairs.

The revolution in military affairs is linked both to perceptions and to organizations. Wheatley explanation of the ubiquity of the out-

dated Newtonian paradigm helps explain some of the difficulty of understanding the changing nature of war. Thus, the Newtonian paradigm is the starting point for thinking about war in new and different ways.

Finally, The Structure of Strategic Revolution: Total War and the Soviet Warfare State argues that thinking about war in new and different ways is a necessary prerequisite to a revolution in military affairs. Written by James J. Schneider, the work explains the development of Soviet warfare as the result of a revolutionary (in both senses of the word) strategic paradigm. The new paradigm was made possible by "the Industrial Revolution - really three mutually reinforcing revolutions in warfare, economics, and society, all united by technology - [which] induced a corresponding revolution in thought."⁷³ The four works by the Tofflers, cited at the beginning of this chapter, present their opinion that the Information Revolution is likewise comprised of mutual revolutions in warfare, economics, and society. This thesis argues that, along with the concepts described by Wheatley, this makes possible a new revolution in thought.

To underscore the importance of role the revolution in thought, Schneider's title purposely invokes the seminal work on the subject, The Structure of Scientific Revolution by Thomas S. Kuhn. With some caveats, Schneider extends the work of Kuhn and I. Bernard Cohen (Revolution in Science) to contrast and compare the revolution in Soviet strategic thinking with revolutions in science. He says:

It is important to note that, unlike revolutions in natural scientific thought, revolutions in military science-and in the social sciences in general-entail an objective revolution in the underlying reality of the very substance of the revolution: the revolution in war entails the revolution in military thought. Notice that in the so-called Galilean and Copernican revolutions the structure and process of the solar system remain the same; it is only looked at in an entirely different manner. This new way of looking at the solar system itself constitutes the revolution. Unlike natural scientific revolutions, military and political revolutions are historically mediated, that is, qualitative changes in the underlying reality are induced by man himself. For example, with the Industrial Revolution commanders actively chose to adopt certain technological devices that transformed qualitatively the very substance of military reality.⁷⁴

Wheatley might dispute Schneider's contention that the underlying reality of natural sciences does not change; as is shown later, quantum mechanics and chaos theory refute the idea of an objective reality. More important, though, is the effect of Schneider's revolution in thought: whether in science or war, for all intents and purposes the new perspective redefines reality. Conversely, if Schneider's revolution in thinking does not accompany it, the change in reality is irrelevant: the military potential of the new technologies is not fully exploited.

This anticipates the argument of this thesis: that the larger Information Revolution, and the science and technology that accompany it, makes possible a revolution in the way war is conceived of and conducted. To evoke this potential, however, requires revolutionary thinking.

Schneider's avowed purpose is "to provide the *rational* foundations"⁷⁵ of the decision-making that engendered the revolution in Soviet military theory and strategy. Here, too, he anticipates the direction of this thesis. The next chapter attempts to create a rational but new framework that explains a possible revolution in war. Schneider indicates that a revolution in thought coincident with the Industrial Revolution made possible the Soviet revolution in military affairs. Wheatley states that current developments in science are creating a revolution in thought. The Tofflers argue that the Information Revolution or Third Wave will, like the Industrial Revolution before it, revolutionize all aspects of society. Chapter Three attempts to show how the revolution in thought caused by new sciences and the empowerment of individuals coincident with the Third Wave may shape the next revolution in military affairs, for those who choose to evoke its potential.

In terms of the detective analogy used earlier, Schneider seeks to explain a "criminal" of the past, this thesis the "suspects" still at large. In both cases, although it may differ profoundly from ours, their intellectual framework has consistent, rational patterns. The evidence here suggests those patterns originate in the related revolutions in

science and society. The next chapter analyzes today's revolutions in science and society to anticipate one such framework.

Endnotes

¹James R. FitzSimonds and Jan M. van Tol, "Revolutions in Military Affairs," Joint Force Quarterly, 4 (Spring 1994), 31.

²Grant T. Hammond, "Paradoxes of War," Joint Force Quarterly, 4 (Spring 1994), 7.

³T. A. Heppenheimer, "Build-Down," American Heritage, 44/8, (December, 1994).

⁴A. J. Bacevich, "Preserving the Well-Bred Horse," The National Interest, 37 (Fall 1994), 44.

⁵Ibid., 47.

⁶Ibid., 48.

⁷Ibid.

⁸Ibid., 49.

⁹Alvin Toffler and Heidi Toffler, War and Anti-War: Survival at the Dawn of the 21st Century, (Boston, Little, Brown and Company, 1993), 5-11.

¹⁰See Jeffrey R. Cooper, Another View of the Revolution in Military Affairs, (Carlisle Barracks, PA, Strategic Studies Institute, U.S. Army War College, 1994) and Andrew F. Krepinevich, "Cavalry to Computers: the Pattern Of Military Revolutions," in The National Interest, 37, (Fall 1994). Cooper believes there have been four RMAs since the Napoleonic RMA, last one associated with a social political RMA; Krepinevich cites ten examples of RMA since the fourteenth century.

¹¹Future Shock, The Third Wave, and Powershift were published under only Alvin Toffler's name; throughout War and Anti-War he is careful to credit wife Heidi as co-author of each.

¹²Alvin Toffler and Heidi Toffler, War and Anti-War: Survival at the Dawn of the 21st Century, (Boston, Little, Brown and Company, 1993), 148.

¹³Ibid., 184/185.

¹⁴Ibid.

¹⁵Ibid., 21. The Tofflers call civilization the only term "sufficiently all-embracing to include such varied matters as technology, family life, religion, culture, politics, business, hierarchy, leadership, values, sexual morality, and epistemology."

¹⁶Ibid., 29/30.

¹⁷Keegan is referred to in their text but not in their bibliography. Although he did not capture it as succinctly as the Tofflers - "the way we make wealth is the way we make war" - Keegan simultaneously advanced the same concept - that each civilization gave rise to a distinctive form of warfare. Although possessing superb credentials and well read by military professionals and history buffs, Keegan does not have the Tofflers audience.

¹⁸Andrew F. Krepinevich, Jr., "Keeping Pace with the Military-Technological Revolution," Issues in Science and Technology, 10/4, (Summer, 1994), 23.

¹⁹Ibid.

²⁰Martin van Creveld, The Transformation of War, (New York, The Free Press, 1991), 32.

²¹Ibid., ix.

²²Paul Seabury, and Angelo Codevilla, War: Ends and Means, (New York, Basic Books, Inc., Publishers, 1989), 3.

²³Ibid., 149.

²⁴Ibid., 119.

²⁵Alvin Toffler and Heidi Toffler, War and Anti-War: Survival at the Dawn of the 21st Century, (Boston, Little, Brown and Company, 1993), 48.

²⁶Paul Seabury, and Angelo Codevilla, War: Ends and Means, (New York, Basic Books, Inc., Publishers, 1989), 119.

²⁷Ibid., 15.

²⁸Ibid., 18.

²⁹Colin S. Gray, Weapons Don't Make War, (Lawrence, University Press of Kansas, 1993), 2.

³⁰Ibid., 170.

³¹Ibid., 176.

³²Ibid., 4.

³³Ibid., 177.

³⁴Vannevar Bush, Modern Arms and Free Men, (New York, Simon and Schuster, 1949), 2.

³⁵Ibid.

³⁶Ibid., 263.

³⁷Ibid., 4.

³⁸Ibid., 263.

³⁹Alvin Toffler and Heidi Toffler, War and Anti-War, 202, among others.

⁴⁰Bush, 263.

⁴¹Ibid., 262.

⁴²Ibid., 3.

⁴³Ibid., 263.

⁴⁴Ibid., 6.

⁴⁵Frank Kitson, Warfare as a Whole, (London, Faber and Faber Ltd, 1987), 1.

⁴⁶Ibid.

⁴⁷Ibid., 2.

⁴⁸Ibid.

⁴⁹Kitson does not further defined this term.

⁵⁰Kitson, 11.

⁵¹Ibid.

⁵²Emmanuel G. Mesthene, Technological Change, (Cambridge, Harvard University Press, 1970), v.

⁵³Ibid., vii.

⁵⁴Ibid., 26.

⁵⁵Ibid., 28.

⁵⁶Glenn E. Schweitzer, Techno-Diplomacy, (New York, Plenum Press, 1989), viii.

⁵⁷Ibid., 12.

⁵⁸Ibid., 1; defined as the art and practice of conducting negotiations between countries with conflicting technical interests.

⁵⁹Barry M. Blechman, and Stephen S. Kaplan, Force Without War, U.S. Armed Forces as a Political Instrument, (Washington, D.C., Brookings Institution, 1978), 532.

⁶⁰George Freidman, and Meredith LeBard, The Coming War with Japan, (New York, St. Martin's Press, 1991), xiv.

⁶¹Ibid., 3.

⁶²Ibid., 6.

⁶³Ibid., 9-10.

⁶⁴Ibid., 12.

⁶⁵Steven Metz and James Kievit, The Revolution in Military Affairs and Conflict Short of War, (Carlisle Barracks, Pa., Strategic Studies Institute, U.S. Army War College, July, 1994), 1.

⁶⁶Ibid., 5.

⁶⁷Jeffrey R. Cooper, Another View of the Revolution in Military Affairs, (Carlisle Barracks, PA, Strategic Studies Institute, U.S. Army War College, 1994), v.

⁶⁸Ibid., 14.

⁶⁹Michael J. Mazarr, The Revolution in Military Affairs: a Framework for Defense Planning, (Carlisle Barracks, PA, Strategic Studies Institute, U.S. Army War College, 1994), 2.

⁷⁰Ibid., 7.

⁷¹Ibid., 12.

⁷²Ibid., 16.

⁷³James J. Schneider, The Structure of Strategic Revolution: Total War and the Roots of the Soviet Warfare State, (Novato, CA, Presidio Press, 1994), 4.

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⁷⁵Ibid., 276.

CHAPTER THREE

PARADIGM SHIFT

. . . be aware that for the military mind the Clausewitzian outlook is the most comfortable one. The professional military man is preoccupied with the problem of using military power effectively. Such power is used most effectively (and moreover is sanctioned by tradition) when it is at the disposal of a politically stable nation state and directed against other states. This is the Clausewitzian paradigm of war.

- Anatol Rapoport, introduction to On War¹

Military thinking about the RMA tends to focus on warfighting. Other authors (the Tofflers, John Keegan, Samuel Huntington, Martin Van Creveld and, much earlier, Theodore Ropp and Larry Addington) are now more frequently highlighting the relationship change in war has with change in the larger, defining characteristics of social organization such as ideology, economics, politics and culture. Sweeping technological advances tend to affect all of these aspects of human endeavor, creating synergies of change that not only alter their nature, but also the way they interact. The intellectual framework that well explains their nature, interaction, and manipulation might be considered a paradigm. Although originally invented to describe a process specific to the scientific community, paradigms are useful devices to consider the effect of different perspectives on war. Viewed as an intellectual framework of temporary accuracy and usefulness, paradigms become central to any discussion of war and how it changes.

Paradigms and paradigm shifts underwrite our dissatisfaction with the results of modern warfare. Many believe that the current "revolution in military affairs" is a panacea. Yet this may be due to a failure to

understand the way a revolution in thought--a paradigm shift--rewrites the "rules of the game." The new rules often favor those who were at a disadvantage under the old. Here the argument is presented that just such a revolution in thought is possible coincident with the current revolution in military affairs. Specifically, there are three interrelated paradigm shifts that a new paradigm of warfare and a different perspective on the RMA. Significantly, the common denominator, the point at which all three shifts intersect, is our perception of power. The paradigm shifts include the change in the fundamental concepts on which our methods of analysis are based; changes in the relative distribution of power, on which we base our expectations of the purpose and usefulness of war; and change in the assumptions on which our Clausewitzian or neo-Clausewitzian philosophy of war is based. The combined effect of all three is that war may no longer be what we understood it to be--that is, different "rules" may apply--because our framework of analysis and the context in which we understood it is obsolete. Failure to update our conceptual framework consigns us to old thinking about new things and preserving Haig's well-bred horse.² We cannot properly assess the potential of the revolution in military affairs until we update our vision of war.

Because these paradigm shifts are virtually inseparable, the analysis below is not organized to address each in its turn. Instead, it begins with the role Newton's science--Kuhn's penultimate paradigm--played in the Industrial Revolution, and covers the continuing influence of that paradigm. Clausewitz's *On War* is shown to be a paradigm heavily influenced by Newton. But it is also shown that the basic assumption of the Clausewitzian paradigm--the existence of a monopoly of power symbolized by the center of gravity--is no longer universally applicable. Equally important, the same is true of the Newtonian foundation in which the Clausewitzian paradigm is based: new scientific theory in several fields indicates it is inadequate to describe how the world works. These new sciences are then used to construct the outlines of a different

intellectual framework, or paradigm. This new paradigm achieves decisiveness not through force vectors acting on a center of gravity but through the initiation of a process of change within the adversary, which is viewed as a dissipative structure. A decidedly different way of thinking, this model better accounts for, perhaps even reconciles, some of the disparities in the classic Clausewitzian view of war: the inability to predict the outcomes of our actions, the varying degrees of decisiveness achieved, operations other than war, and growing concerns with legitimacy and the media. The attempt to reconcile real-life disparities with accepted theory is usually the origin of a new paradigm.

Paradox

A paradigm becomes obsolete when it no longer accurately describes reality. The difference between reality and paradigm-based expectations of reality start small and are initially ignored as irrelevant anomalies. Failure to adjust the paradigm to account for the anomalies results in an increase in their severity and frequency. If the paradigm is still not adjusted, the anomalies grow until they produce absurd contradictions, paradoxes, that presumably can no longer be ignored. The process continues until the paradigm is modified or replaced.

Our paradigm of modern warfare is exhibiting signs of obsolescence. Paradoxes abound. The two most (militarily) powerful nations--the United States and the USSR--were ultimately unable to impose their will on nations many times less capable. Despite the emergence of weapons of greater and greater destructiveness and lethality, modern warfare has become less decisive than ever. Rather than exploit its advantage, the sole remaining military superpower feels compelled to emphasize multilateral action and coalition warfare. Military thinkers are frequently the strongest advocates for non-military courses of action, while their civilian counterparts seem to more readily advocate military

action. Our Army, optimized in terms of training and equipment for war, spends the majority of its time in operations other than war. Individuals and tactical units suddenly are observed to have--intended or not--strategic impact, once presumed to be reserved for nations or their instruments. Asymmetric modernization, an outgrowth of the so-called revolution in military affairs, is skewing balance of power estimates or at the very least, feasibility estimates. And, despite his defeat in the Gulf War, Saddam endures in power, while his victorious opponent, George Bush, was voted out.

Although influenced by other theorists and practical experience, our paradigm of warfare was established primarily by Clausewitz. Like Marx, Clausewitz borrowed heavily from the work and imagery of Newton to explain and describe that aspect of the world in which he was most interested: the application of power to move people to action. The current "inutility of the western way of warfare"³ has less to do with Clausewitz's fallibility than our own failure to recognize the differences between the world he described and the one in which we live today. Power in Clausewitz's world rested solely with the state and was epitomized by the armies of Prussia and France. Other forms, such as British seapower, diplomacy, and economics, barely rate a mention in On War. The information instrument of power is recognizable only as the power of ideas and tangentially mentioned as patriotism, the explanation for the ferocity and success of the otherwise unimpressive French Army. But power today exists in many forms and is available to many people. This alone might be sufficient to challenge the Clausewitzian paradigm. More importantly, though, the Newtonian foundation of Clausewitz's philosophy is being shown daily to be inadequate.

Bernard Brodie said Clausewitz's On War "is not simply the greatest, but the only great book about war."⁴ Martin Van Creveld concurs, stating:

Among military theorists, Clausewitz stands alone. With the possible exception of the ancient Chinese writer Sun Tzu, no other author has ever been remotely as influential, and indeed his work forms the cornerstone of modern strategic thought. His continuing relevance is perhaps best illustrated by the fact that he is one of the few military thinkers to whom homage is paid on both sides of what, until recently, used to be the Iron Curtain.⁵

But more than any other single person, it is Sir Isaac Newton who is responsible for Clausewitz's acceptance, and ultimately, the manner in which war evolved since Napoleon. While Clausewitz and On War are to the military what Newton and Principia are to the sciences, Clausewitz's work is founded in the context of the universally adopted vision of the world Newton described. Newton's description of the world's inner workings and the appropriate methods to reveal them fundamentally influenced every aspect of Western society. Newton provided the master paradigm within which the Clausewitzian paradigm made sense. This has profound implications for those who would understand the changing nature of war.

The Newtonian Paradigm

Nature and Nature's Laws lay hid in Night;
God said, Let Newton be: and all was Light.

- Alexander Pope, Epitaph Intended For Sir Isaac Newton

Well over a century before the publication of On War, Principia established Newton as the most influential scientist of the Industrial Age and provided the cornerstone of modern thought. In A History of Knowledge, Charles Van Doren writes:

The publication . . . of Isaac Newton's Mathematical Principles of Natural Philosophy [Principia] was both an end and a beginning. . . . this book summed up and concluded a great adventure in human thought, revealing to mankind the apparently definitive mechanical principles of the natural world. **But the idea and image of this world, so newly conceived of as mechanical, also opened up new avenues of thought and action.**⁶ (my emphasis added)

The publication of Principia articulated three rules that governed the motion of all things:

(1) Every physical body continues in its state of rest, or of uniform motion in a straight line, unless it is compelled to change that state by force or forces impressed upon it.

(2) A change of motion is proportional to the force impressed upon the body and is made in the direction of the straight line in which the motion is impressed.

(3) To every action there is opposed an equal reaction.⁷

These rules explained the movement of the planets, the trajectory of a cannonball, the period and path of a pendulum. In short, they explained the precise, regular and predictable movement observed in a deterministic world.

It is important to note that, to prove his theories, Newton invented a new form of analytical mathematics, geometric calculus. Geometric calculus considered incrementally smaller pieces of an irregular shape in order to more closely approximate its area or volume. From the beginning, Newton built on Descartes' assertion that accuracy and truth were to be obtained through precision, which in turn was to be achieved by considering smaller and smaller parts of the whole. This mathematical analysis led directly to the scientific method, which retained its presumption of a universal relationship between truth, precision and increasingly minute measurement. Van Doren notes that this method of analysis is contained in Book Three of Principia, which Newton entitled "The System of the World." There were four rules of reasoning:

- (1) Admit no more causes of natural things than such as are both true and sufficient to explain the appearances.
- (2) To the same natural effects we must, as far as possible, assign the same causes.
- (3) The qualities of bodies which are to be found in all bodies within the reach of our experiments, are to be esteemed the universal qualities of all bodies whatsoever.
- (4) In experimental [science] we are to look upon propositions inferred by general induction from phenomena as accurately or very nearly true, notwithstanding any contrary hypothesis that may be imagined, till such time as other phenomena occur, by which they may either be made more accurate, or liable to exceptions.⁸

There was an additional caveat, Van Doren continues, for Newton loathed hypotheses: "[this] argument of induction may not be evaded by hypotheses." Hypotheses, to Newton, were unsupported conjecture, not deduced from observed phenomena and thus had no place in his world.⁹

Newton's most famous experiment with light contributed to the way in which this new world was perceived and illustrates a key characteristic of Newtonian thought. To understand its nature, Newton viewed white light through a prism, noting it refracted into the colorful spectrum of visible light. When sent through a second prism, the colors combined to again form white light. When considered with his reasoning that "the qualities of bodies which are to be found in all bodies within the reach of our experiments, are to be esteemed the universal qualities of all bodies whatsoever," it is no wonder we hold Newton responsible for our tendency to judge the whole by scrutinizing its parts.

The Newtonian legacy included both a description of the world and a particular way of thinking. His rules of motion spoke of a specific world view. In the Newtonian vision, the universe was a vast, complex, clock-like machine, complicated but understandable with sufficient intellectual effort. The clock maker was "infinitely rational, his works were totally predictable, and a few simple laws would reveal what made everything work. Reductionist thinking proliferated."¹⁰ Not only could the universe be understood but, with its machine-like regularity, it could be predicted. A belief in this determinism and application of Newton's Laws of Motion allowed men to alter the world on a grand scale and begin the Industrial Revolution:

by 1700, Galileo, Descartes, and Newton, together with a host of scientific contemporaries, had changed . . . ignorance into knowledge. Suddenly practical men realized *why* machines did what they did. As a result they saw how to make them do it better. The discoveries in mechanics came with astonishing rapidity, one after another, and each new discovery called for the next.¹¹

The Master Paradigm

The second part of the legacy is more profound, for it taught us how to think and how to organize knowledge, that is, our commonly held beliefs. It is Newton's paradigm:

The four rules of reasoning, and the added prohibition against hypothesizing, that is, offering explanations not directly supported

by experiments, could be said to define the scientific method as it has been practiced since Newton's time and as it is still practiced, for the most part, today. Newton's rules established a new paradigm, to use a term employed by the eminent historian of science, Thomas S. Kuhn, in The Structure of Scientific Revolutions (1962). The new paradigm inaugurated the age of science. The most valuable and useful tool for acquiring knowledge ever invented had been distributed among men, and with it they would proceed to try to understand everything they could see and many things they could not, as well as control the world around them in heretofore unimaginable ways.¹²

Kuhn's paradigm has two salient characteristics. First, it must be sufficiently unprecedented to attract an enduring group of adherents away from competing modes of explanation. (This brings to mind General DePuy's dominating concept; a line of thinking so profound and different that it seizes the intellectual initiative, forcing all it encounters to acknowledge it and react.¹³) Secondly, it must be sufficiently open-minded to leave all sorts of problems for the redefined group of practitioners to resolve.¹⁴ Kuhn also notes other characteristics. One paradigm may replace another, but often a paradigm marks the first appearance of a single dominant explanation. The originator's name becomes a kind of shorthand reference, a frequently invoked rubric like 'Copernican astronomy' or 'Newtonian physics.' Study of the seminal work, like Newton's Principia, or his Optiks, becomes the means by which the adherent is prepared "for membership in the particular . . . community with which he will later practice."¹⁵ Finally, the single most prevalent claim advanced by proponents of new paradigms is that it solves the problems that led the old one to crisis. In Newton's case this was the reconciliation of celestial and terrestrial mechanics.¹⁶ Van Doren writes:

When Principia finally appeared in 1686, it made the world gasp. The greatest problem in the history of science up to that time, the problem of how and why the universe worked as it did, had been solved.¹⁷

Newton's legacy, then, is not only his explanation of motion that truly enabled the Industrial Revolution, but also our master paradigm, the method of analysis that was easily transferred to efforts to solve other poorly understood phenomena, in all disciplines of knowledge.

The Clausewitzian Paradigm

Without ever mentioning "paradigm," Michael I. Handel states that Clausewitz "did for war what Copernicus did for astronomy, Newton for physics, and Darwin for natural history. On War represents a revolution of ideas, a transformation of man's conception of war and his place in it. This was "a break with continuity, the establishment of a new order that . . . severed its ties with the past."¹⁸

Anatol Rapoport goes further, stating "Clausewitz views war as a rational instrument of national policy. The three words 'rational,' 'instrument,' and 'national' are the key concepts of his paradigm."¹⁹ Later he continues:

The actors in the Clausewitzian paradigm for international relations are, as has been said, sovereign states which for all practical purposes can be considered as persons.²⁰

On War meets Kuhn's basic definition of a paradigm. It was sufficiently unprecedented and general to ensure a sufficient amount of problems for military theorists. As Handel notes, it established a new order, the appearance of a single dominant, albeit general, theory of war, with an ardent following. The shorthand is ubiquitous: "Clausewitzian warfare" is such a frequently invoked rubric that it may have become cliché, or as Martin Van Creveld believes, lost its original meaning. Clausewitz's purpose, of course, was to explain the Prussian catastrophe at Jena.²¹

But Kuhn's paradigm is a more subtle thing than either Handel or Van Doren explain. The paradigm not only explains the world. It also biases our perception of the world, and how we learn about it. It causes us to filter out, ignore, or otherwise minimize points where the paradigm doesn't completely explain reality. Clausewitz did this when he summarily excluded most military history prior to 1648 as having little relevance to his study. Kuhn might say that Clausewitz's real objection was that these earlier wars did not fit his understanding of the world. It is no coincidence that the wars Clausewitz saw as relevant existed in the world

as explained by Newton. Newton's paradigm provided Clausewitz's point of reference. After three hundred years of use, it is also ours: Newton's explanations and methods have combined to form a sub-conscious, or perhaps more precisely *unconscious*, perspective on the world.

In Leadership and the New Science, Margaret Wheatley says that Newton gave us the universe we "know," with all its implied filters:

Each of us lives and works in organizations designed from Newtonian images of the universe. We manage by separating things into parts, we believe that influence occurs as a direct result of force exerted from one person to another, we engage in complex planning for a world that we keep expecting to be predictable, and we search continually for better methods of objectively perceiving the world. These assumptions . . . come to us from seventeenth century physics, from Newtonian mechanics. They are the base from which we do research in all of the social sciences. **Intentionally or not, we work from a world view that has been derived from the natural sciences.**²² (my emphasis)

Michael Howard indicates Clausewitz understood and probably rejected Newton's world view or paradigm:

There had been no lack of effort before Clausewitz's time to apply scientific principles to the conduct of war. Throughout the eighteenth century there was a widespread impatience that, in an age when the universe was yielding more and more of its secrets to scientific enquiry and when reason was replacing custom and superstition as the criterion of human judgement, the conduct of war should still be such a clumsy, wasteful and uncertain business. . . . But this search for scientific certainty in military affairs was taking place at a time when thinkers in other areas of human activity were beginning to question the whole idea of scientific certainty, a Newtonian universe whose objective reality was governed by forces and principles quite external to man. The idea that man . . . created . . . and moulded the world through his own consciousness had taken deep hold in Germany. . . . Intellectually Clausewitz was very much a child of his time. For him war was not an activity governed by scientific laws but a clash of wills, or moral forces.²³

But Howard contrasts the two--scientific law and moral force--too much. Handel provides a more illuminating interpretation:

Like so many other German intellectuals of his time, he combined the best of two worlds - the tradition of the Enlightenment, which emphasized rational objective analysis and the search for clarity, with the German romantic tradition (formulated in part as a reaction to the French as representative of the Enlightenment), which focused on the psychological, emotional, intuitive and subjective dimensions in the interpretation of the surrounding world. The dialectical relationship between the Enlightenment on the one hand and German romanticism on the other - the two elements complementing rather than contradicting one another - created a synthesis on a higher level. Representing the duality of human nature, his theory is as successful; in presenting the calculating and rational side of war as in analyzing its non-rational and unpredictable qualities. While war is waged

primarily to achieve rational ends, it is not a rational process. Hence his emphasis on the role of uncertainty, chance, friction, and luck in war owes as much to German romantic perceptions of the human condition as to Newtonian rationality.²⁴

The idea of man shaping the world by the force of his will was not inconsistent with Newton's Laws or their manifestation in the nascent Industrial Revolution. Rather than reducing him to an insignificant bystander, Newton gave man the master clock-maker's secrets and the ability to take his place.

Nor was uncertainty alien to Newtonian reasoning. Long before Clausewitz, Newton had to account for the difference between the ideal and actual worlds. With Newton's clock-work universe

the concept of entropy entered our collective consciousness. Machines wear down; they eventually stop. In Yeat's phrase, 'Things fall apart; the centre cannot hold, mere anarchy is loosed upon the world. . . .' If we want progress, then we must provide the energy, the momentum, to reverse decay. By sheer force of will . . . we will make the world hang together.²⁵

Clausewitz adopted the same explanation for his similar problem:

Real wars differ from abstract war, says Clausewitz, because idealized conditions are never realized. Mobilization of forces is not instantaneous; events are governed not only by strict causality but also by chance; psychological factors are important determinants of decisions made by men, etc. Clausewitz subsumes all of these perturbing circumstances under the concept of 'friction,' an obvious allusion to the analogous concept in physics, which is invoked to explain the discrepancy between real and idealized mechanical processes.²⁶

Friction, the metaphor Clausewitz used to account for all the causes of uncertainty, is very much a part of Newton's world view.

Despite Clausewitz's assertion that war is more art than science,²⁷ there are other indications that Clausewitz set the foundations of his conceptual framework in Newton's paradigm. Although it is a bit of a reach to compare translated German to today's version of eighteenth century English, Clausewitz seems to have adopted the eighteenth century scientific lexicon for his own. That science, for the most part, owed its common vocabulary and methods to Newton. Friction, mass, force, elements, theory, law, method, action, and reaction appear repeatedly in On War. More parallels are evident in Clausewitz's dictums. Compare "War is thus

an act of force to compel our enemy to do our will"²⁸ to Newton's first law of motion: "a body continues at rest or in uniform motion until it is compelled to change." Clausewitz's statement that "the second attribute of military action is that it must expect positive reactions"²⁹ is Newton's third law: "for every action there is opposed an equal reaction." Similarly, Newton's second law (motion is proportional to force applied) seems to be present in the following:

If the enemy is to be coerced you must put him in a situation that is even more unpleasant than the sacrifice you call on him to make.³⁰

or,

Any change that might be brought about by continuing hostilities must then, at least in theory, be of a kind to bring the enemy to still greater disadvantage.³¹

Clausewitz drew on more than Newton's laws of motion. Peter Paret's interpretation of the Clausewitzian function of theory in the analysis of war is highly reminiscent of Newton's rules of reasoning:

Theory must be comprehensive, that is, able to account all aspects of its subject. . . . [Newton's Rule 3: results determined locally are assumed to be universal];

It must be based on the constants or absolutes of its subject, not on phenomena that may be temporary. . . . [Newton's Rule 2: To the same natural effects we must assign the same causes.];

Theory must constantly pass the test of reality . . . [it] must be sufficiently flexible and open to take account of imponderables, and it must have the potential for further development. [Newton's Rule 4: look upon empirically developed theory as accurate or very nearly true until disputed by observed phenomena, when it is to be made more accurate or subject to exception.]³²

Newton's injunction against "hypothesizing" appears to contradict what Paret describes as Clausewitz's dialectic of "constant interplay between the observable present and hypotheses concerning the timeless phenomena of war,"³³ until it becomes apparent that the same term is used with different intent. To Newton, hypotheses represented all that was bad in earlier scientific thought: mere conjecture with no grounds in observable fact. Clausewitz, too, shared "the practical man's horror of abstractions that could not be related to fact, of propositions that could not be illustrated by examples, of material that was not relevant to the

problem in hand."³⁴ His hypotheses were to be discovered by historical study, common sense, and logic.³⁵ Here, too, there seems to be more similarity than difference.

Other influences not excluded, Clausewitz shared Newton's vision of the world. Indeed, it would have been difficult for him to comprehend the sciences of his time without accepting the conceptual framework from which they sprang. We too believe Newton's paradigm, for it has permeated virtually all knowledge and "we have prospered in this belief for many centuries."³⁶ Once Von Moltke publicly endorsed On War, the high degree of consonance between Clausewitz and Newton facilitated its rapid acceptance. It "fit" both the master paradigm of the day--Newton's--and daily experience in a world organized according to Newtonian precepts.

Powershift Paradigm shift

A key Newtonian precept borrowed by Clausewitz that remains popular today is center of gravity. Newton used it to simplify the mathematical treatment of gravitational forces on planets: static, heterogeneous entities symbolized by a homogeneous point. This simplification enabled him to develop his general rules of motion that reconciled the movement of terrestrial bodies with that of celestial bodies. Taking the metaphor for his own, Clausewitz employed it to explain in simple terms how military forces should act on enemy states. In the relatively static, dynastic system of his time, the simplification was not overdone:

This paradigm (which today is recognized by many political scientists to be a highly abstract idealization) was a moderately realistic model of the international system which Clausewitz knew best. . . .³⁷

But this idealization was only temporarily appropriate and Rapoport's comment highlights a growing problem with the Clausewitzian paradigm. For Clausewitz, significant international power was a capability and function of sovereign nations and only sovereign nations. Perhaps due most to the Industrial Revolution, this has been less true with each passing year.

The differences between the implications of this most basic assumption of Clausewitz's paradigm and the reality of today can no longer be ignored. The shift of the monopoly of power from nation/states to individuals augurs for a paradigm shift.

The connections between several of the most frequently noted trends--decreasing decisiveness of war, emergence of non-nation/state actors, merging levels of war, the revolution in military affairs, and the Tofflers' Third Wave--become more readily apparent when considered in terms of power, or more appropriately, relative power. The underlying concept is one of articulation, a concept repeatedly advanced by Archer Jones in The Art of War in the Western World. Although never explicitly defined, his many examples imply that articulation can be thought of as the sub-division of a force to the lowest level independently capable of affecting the outcome. Put another way, articulation is the smallest group with significant power. Today, we may be achieving the irreducible minimum: the individual.

Individuals are becoming more powerful. Advances in science and technology are placing in the hands of ordinary people tools possessing power once accessible to only the most wealthy and educated, or to nations. Personal computers now can store more data in minutes than most individuals could previously assemble in their library over a lifetime. The majority of the world is accessible by plane within a day, by personal communication devices--fax, modem, cellular phone--in minutes. Information and knowledge are no longer the possession of a select few. With the aforementioned information technologies, free worldwide television news coverage, satellite communications, Internet, and the explosion of market-driven information services, most individuals have access to more sources than they can personally process.

These technologies enable individuals or small groups to assume roles and exercise powers previously reserved for national governments. At the outset of World War I, there was a two week difference between when

the government learned of the assassination of the Archduke and when the American public was told. No longer can a government rely on such an "information float" for time to formulate strategy and shape public opinion. Now, as often as not, CNN informs the world of critical events before government officials are briefed. Except limited areas, Western governments cannot presume to be better informed than their constituents.

Nor is a government's diplomatic power the monopoly it once might have been. The constituents of one nation can now converse with their counterparts in other nations through a variety of informal, instantaneous and nearly instantaneous means. Similarly equipped individuals have the potential to establish consensus and demonstrate agreement well before official efforts bear fruit. Such capabilities can transcend national boundaries and policies, potentially undermining agreements between nations by increasing the frequency and significance of agreements between groups within different nations.

These same technologies have re-defined the relative economic power of individuals; their ability to affect the condition or behavior of governments or international institutions. Real time, large scale information processing allows individuals to affect a nation's economic policies. Currency speculators can dramatically change the value of a nation's money with a few phone calls or keystrokes as they move electronic money. Miscalculation by a twenty-eight year old futures trader can bankrupt an internationally respected bank, one of the oldest and largest of the United Kingdom. Similarly, disastrous derivatives investments by an elected official jeopardizes the solvency of one of the largest counties in California. To an unprecedented degree, empowered individuals can make their presence felt nationally and internationally.

National military power is also affected by the increase in individual and small group power. Mass production of weapons makes them inexpensive and accessible to individuals. Weapons technology is readily available and easily transferred. The collapse of the former Soviet Union

has allegedly made nuclear weapons experts available to the highest bidder and obscured the accountability of tactical nuclear weapons. Weapons of mass destruction are available to small groups. Sufficient information to construct a rudimentary nuclear device is available in the open press, in textbooks, on the Internet. Automatic weapons are so common that there exists, in many places, a presumption that everyone should have the right to possess them; and teenagers use them against other teenagers in drive-by shootings. Individuals employing mass produced, low technology weapons such as RPGs, land and sea mines, man portable surface to air missiles and artillery cause significant problems for our high technology military tailored to wage war against similar forces of other nations; forcing us to alter our doctrine, and criteria for employing national military forces. Once again, the relative power of the individual has risen in relation to its national counterpart.

The increasingly dynamic changes in the relative power of individuals and states makes it less appropriate to use the center of gravity metaphor. Unlike dynastic and post dynastic states where power was relatively static; today's dynamic, heterogeneous organizations can not be treated as a simplified point. The metaphor fails because there are too many players with significant power who continuously alter the distribution of power. There may not be one hub from which all power springs. This refutes a basic presumption of the Clausewitzian paradigm, and is one reason why it no longer accurately describes the role of military power in achieving national objectives.

New Sciences . . . New Paradigm

A second argument for a new framework is that the paradigm set forth in Newtonian science--the one from which Clausewitz borrowed concepts and terms--is being challenged by new scientific developments. These sciences describe a world that often adheres to rules quite different from those expected by Newton, Clausewitz and today's students

of war. To a scientist and historian like Kuhn, this would perhaps explain why so many respected writers (e.g. John Keegan, Martin Van Creveld, Alvin and Heidi Toffler, Steven Metz) are noting with ever increasing frequency that Clausewitz's theory seems, at best, limited or out of date. Kuhn would note that On War is based on Newton's paradigm, and that advances in quantum theory, chaos theory and other disciplines are proving Newton's paradigm inadequate. As Margaret Wheatley puts it:

the science has changed. If we are to continue to draw from the sciences to create and manage organizations, to design research, and to formulate hypotheses about organizational design, planning, economics, human nature, and change processes (the list can be much longer), than we need to at least ground our work in the science of our times. We need to stop seeking after the universe of the seventeenth century and begin to explore what has become known to us in the twenty-first century. We need to expand our search for principles of organization to include what is presently known about the universe.³⁸

What has become known to us in the twenty-first century are the principles of quantum mechanics, chaos theory, dissipative structures and morphogenic fields. These advances of scientific knowledge more accurately describe our world than Newton's classical physics. But, in a truly radical departure from Newtonian precepts, they do not describe a constant, deterministic world. Instead, they describe a world that is literally what we make of it. The new sciences argue for a new master paradigm. A shift in the master paradigm, in turn, calls into question all paradigms using it as a foundation. Thus, our paradigms of war and of power, with their common Newtonian concepts of cause and effect, reductionism, center of gravity, force, mass, action and reaction, etc., require an infusion of post-Newtonian ideas. To understand how new patterns of thought are available to the "criminals at large" in the earlier detective analogy, or more bluntly, why a revolution in thought is possible, a review of some of the new but recurrent lessons these disparate disciplines teach is necessary.

For instance, quantum mechanics explains common, worldwide phenomena that Newtonian or classical physics could not. Newton's world

is made of separate, discrete entities that can be reduced to a single point--a center of gravity--from which it can be considered to act on, or be acted on by, other entities. These discrete entities form larger entities that can be taken apart and analyzed to understand their nature.

'The whole corpus of classical physics,' writes Danah Zohar in The Quantum Self, 'and the technology that rests on it is about the separateness of things, about constituent parts and how they influence each other across their separateness.' Classical physics studies a world of things and how connections work across the separations. In this world of things, there are well-defined edges; it is possible to tell where one stops and another begins, to observe something without interfering with its identity or function. The 'thing' world, therefore, leads to a belief in scientific objectivity.³⁹

Our correlating world view assumes nations, armies and other organizations are similarly made of separate, discrete entities that can be reduced to a neat organization wiring diagram or TOE of component organizations. Such organization can be understood and mastered by analyzing these components.

In the machine model, one must understand the parts. Things can be taken apart, dissected literally or representationally (as we have done with business functions and academic disciplines), and then put back together without any significant loss [of understanding]. The assumption is that by comprehending the workings of each piece, the whole can be understood. The Newtonian model is characterized by materialism and reductionism - a focus on things rather than relationships. . . .⁴⁰

The tendency is to view everything--nations, states, leaders and security problems--as separate entities, and in the process lose their relationship to everything else.

Quantum mechanics theory demonstrates some inadequacies in classical physics. The two slit experiment, in which atomic particles act as both waves and particles depending upon the observers' participation, refutes the concepts of piecemeal analysis, objective observation and a deterministic world of irrefutable laws. Field theory, a concept that reappears in many of the new sciences, emphasizes relationships over discrete entities.

Relationship is the key determiner of what is observed and how particles [or other things] manifest themselves. Particles come into being and are observed only in relationship to something else. They do not exist as independent 'things.' [They are part of] a strange yet

enticing view of a world that . . . 'appears as a complicated tissue of events, in which connections of different kinds alternate or overlap or combine and thereby determine the texture of the whole. These unseen *connections* between what were previously thought to be separate entities are the fundamental elements of all creation.⁴¹

It is neither the components nor their centers of gravity but the relationships between them that matter.

Quantum based theories of power, of which war might be considered a subset, might indicate that analyzing the structures (TOEs, wiring diagrams) of the adversary organizations misses the point of the organization: the relationships between the people and organizations internal and external to the group. The structure is important only to the extent that it facilitates or inhibits interaction. This interaction might be considered a field, with potential dependent on the number and involvement of participants. Given the manner in which the observer / participant evokes quantum reality, a quantum based philosophy could also be expected to eschew rigid methodologies or conceptual templates.

Chaos theory is evident in all of the new sciences and, now that we know what to look for, many of the old sciences. Chaos was once believed to be complexity so great that it simply had too many variables to accurately track and use to make predictions.⁴² True to its Newtonian outlook, this view held that the key to understanding chaotic systems was to simplify and reduce the variables. Since chaos was cast as the antithesis of order and predictability, chaos was a negative factor. In science, it was chiefly represented by entropy or friction. Were it not for entropy and chaos, the world would be predictable, regular and proceed in the direction we moved it.

This led to a widely held belief that from order came efficiency, and that from structure and control came order. Autonomy was perceived to be a step away from anarchy and chaos.⁴³ The role of the manager, statesman or general was to counter chaos and impose order through rigorous control measures and sheer force of will.⁴⁴

Chaos theory now proposes that chaos and order are inextricably inter-related.⁴⁵ Each contains and facilitates the other, in an inevitable, continual process. A system becomes chaotic when it is ordered but unpredictable, and does so in a fashion that remains within recognizably well-ordered and predictable boundaries.⁴⁶ These boundaries are defined by "strange attractors:" computer generated displays that capture the infinite number of possible states the system may achieve.

Chaos theory also challenges the concepts of cause and effect and incremental change. What Newtonian scientists and engineers were taught to ignore--very small differences at the beginning of a problem--chaoticians believe make prediction impossible. Known as sensitive dependence on initial conditions, or the "Butterfly Effect," it is the idea of critical non-local effects espoused in the old tale that begins "For want of a nail the shoe was lost. . . ." The scientific method and other traditions of classical analysis tend to ignore a single nail, or the flap of a butterfly's wings in Beijing when considering the problem of a tornado in Texas. Chaos theory teaches that such simplification assumes that "arbitrarily small influences don't blow up to have arbitrarily large effects."⁴⁷ But they do, and because they do, specific prediction is impossible. Empirically we see this in both unintended or second and third order effects of our actions.

Finally, fractals, the geometry of chaos, re-emphasize the importance of patterns (like the strange attractor) and the futility of objective measurement (captured in Heisenberg's uncertainty principle and demonstrated in the two-slit experiment). Fractals are the patterns within patterns within patterns that we are now discovering throughout nature, as we seek after the incremental precision implied in Newton's calculus. When applied to a seemingly straightforward problem like "How long is the coastline of Florida?" fractals demonstrate that precise measurement is impossible. With greater magnification (or smaller, more

precise increments) a more precise, and different, answer is always possible.⁴⁸

A chaos-based alternative approach--paradigm--for thinking about power might embrace the Chinese definition of crisis: both opportunity and danger. Chaos is a healthy, natural and required stage for renewal and growth of the any system. Equilibrium and stability are not desired as permanent states for they indicate lack of growth and development, i.e. stagnation. Conflict, perhaps even war, might be perceived as an inevitable and essential part of any world order. So too are non local effects of any action. Power, military or otherwise, might not be best imagined as a Newtonian vector that operates against a real or imagined center of gravity to "push" the enemy along a predictable trajectory. Rather, it might be better conceived as a field that interacts with other fields, producing effects that are fractal-like: ultimately unmeasurable and unpredictable but remaining within certain recognizable boundaries. Given the interaction between events, individuals and electronic media, the often invoked concept of "national will" seems to work better as a potentially chaotic (as specifically described above) field than as a center of gravity.

Recent discoveries in biology provide similar images of power and change. One such discovery, that of dissipative structures, has much in common with chaos theory because it too explains change in nature. Formerly, fluctuations, disturbances, turbulence were signs of trouble; acceleration of the process of natural decay that is inherent in all systems (like entropy). These manifestations of change were indications of the decline of the system, change for the worse.

The connotations were profoundly negative:

Both our science and our culture have been profoundly affected by the images of degeneration contained in classical thermodynamics. When we see decay as inevitable, or society as going to ruin, or time as the road to inexorable death, we are unintentional celebrants of the Second Law of Thermodynamics. . . . It is both sad and ironic that we have treated organizations like machines, acting as though they were dead when all this time they've been

living, open systems capable of self-renewal. We have magnified this tragedy by treating one another as machines, believing the only way we could motivate others was by pushing and prodding them into action, overcoming their entropy by the sheer force of our own energy.⁴⁹

Dissipative structures refute this negative view of change. Like a living manifestation of chaos, dissipative structures change due to external stimuli, but renew themselves or "self-organize" according to recognizable if not predictable patterns. Although they change, their new incarnation is similar to their former self, i.e. self-referenced, yet more efficient in the changed environment. Again, order and disorder are inseparable; natural processes of nature. Disorder and disequilibrium play critical roles in creating new, higher forms of order, as environmental disturbances cause these systems to regenerate to higher levels of self-organization. Order is sustained by growth and change.⁵⁰

A correlating model of power would emphasize resiliency instead of stability or equilibrium. Astute analysts would recognize that conflict and change will inevitably occur, but, due to self-referencing, result in a new organization similar to the previous one.

Instead of whirling off in different directions, each part of the system must remain consistent with itself and with all other parts of the system as it changes. There is, even among simple cells, an unerring recognition of the intent of the system, a deep relationship between individual activity and the whole.⁵¹

Such concepts drastically alter commonly held perceptions of what is feasible vis-a-vis modifying the behavior of adversaries. The implications of dissipative structures seem to provide a framework for thinking about the effects of our application of instruments of power in general and the information instrument in particular.

The last of the new sciences considered here, morphogenic fields, also contradicts conventional assumptions of a linear, cause and effect model of behavior modification. Conceptually, morphogenic fields lie at the intersection of quantum theory, dissipative structures and learning theory. Previously, natural selection explained how species "learned." The mechanism was hardship that winnowed out those not suitable to the new

environment. In military history this might be best exemplified by the theories of social Darwinism prevalent prior to World War I. Management theory also subscribed to this survival of the fittest concept. Companies either adapted to changing market conditions or went out of business. Such adaptation relied on the individuals being quickly re-trained or replaced.

Morphogenic fields advance a different view of the learned behavior of a large group. Knowledge may be retained in an undiscovered group memory, an invisible structure that helps shape behavior. Apparently, some of what we know how to do comes not from our own--individual--acquired learning but from knowledge that has been accumulated in a "human species" field, to which we have access. Whole populations shift their behavior because the content of their field changed, not because the individuals have taken the time to learn the new behavior.⁵² While a radical concept, it can not be more radical than gravity was initially; yet we gradually adopted it as a metaphor for other phenomena. And morphogenic fields may account for the observed phenomenon that might be called "the art of the possible;" that is, how generally once a new standard or breakthrough is achieved, others rapidly achieve what was previously unattainable. Alternatively, it may explain some of the intangibles of command climate.

One of the implications for military theory and strategy is that relative advantages based on knowledge, such as high technology for instance, may be governed by this natural phenomena. Strategies relying on retaining a high technology edge may be "unnatural" or at least the non-optimum path. Once a technological breakthrough is achieved, morphogenic fields imply that it is much easier for others to catch up. On a more optimistic note, a strategy of engagement, even at low levels, would seem sound because each engagement adds to the hypothetical morphogenic field, and thus, has an effect larger than the sum of its individual events.

These four disciplines--quantum mechanics, chaos theory, dissipative structures and morphogenic fields--describe a different world that often operates according to different concepts than the one from which we have developed our traditional philosophy of war and power. If the principles and implications that describe the natural world are transferrable to the activities of man, then these new sciences refute the basic assumptions of what has been, to this point, our master paradigm. They also undermine our notions of how power is applied because the rules of the game have been redefined. For our every action, unpredictable non-local effects are as likely as expected, precise effects. Fractals and the two-slit experiment call scientific analysis into question. These things require a new model and method for considering how power, military or otherwise, accomplishes its ends.

It might be helpful at this point to consider how this potentially revolutionary intellectual framework differs from the one in use now. A summary of the above discussion, comparing the extended implications of the Newtonian paradigm and the paradigm outlined by the new sciences, might be as described in Table 1. Under **Concept**, Expectations refer to our general understanding of the rules of the game. Change mechanism refers to how power is applied to impose change. Medium describes the substance of power; point of application describes where it is used. Range and magnitude of effect refer to precision and proportionality. Change in each case is limited by the difference between how change is imposed and the mechanisms that seem to oppose it. Model and control refer to how we visualize and manipulate the object or organization in question. Scope and focus of analysis address how best to understand the target. Desired state, system quality, and strategy orientation refer to the condition, characteristics, and strategy inferred by each model. Perception of conflict contrasts the role conflict plays in each framework.

TABLE 1

PARADIGMS OF POWER:
CONTRASTING VIEWS OF HOW TO CHANGE THE WORLD

Concept	Newtonian	New
Expectations	deterministic objective absolute	probablistic subjective relative
Change mechanism	sufficient, discrete cause and effect	stimulus and self reference
Medium	physical tangible sensed	intellectual intangible not sensed
Point of application	center of gravity decisive point	field node / interface
Range of effect	local, precise	non-local
Magnitude of effect	proportional	disproportional
Change limited by	proportionality vs. friction / entropy inertia	morphogenic non-local vs. strange attractor self-reference
Model	machine	organism
Control	external	internal
Scope of analysis	incremental	holistic
Focus of analysis	components measurements	relationships patterns
Desired state	equilibrium	manageable disequilibrium (bounded chaos)
Desired system quality	stability	resiliency
Strategy orientation	goal	process
Perception of conflict	unnatural preventable	natural inevitable

In science, Newton's concepts are still useful in many specific applications. This would seem to be true too for the implications of those concepts when applied to other disciplines. For instance, center of gravity may still be an appropriate way of thinking of a coherent, homogeneous adversary. Or, if an adversary employs Newtonian thinking, or is one of the Tofflers' Second Wave societies, then perhaps he may be best understood through a Newtonian analysis, since he is likely to organize and operate according to the Newtonian paradigm.

But the new sciences offer the outlines of a new framework from which to plan and make war. These fundamental concepts may be what is "revolutionary" about the revolution in military affairs. This new framework for the application of military power, or any power for that matter, may be entirely consistent with the concepts of the new master paradigm. Alternatively, it might have elements of both, manifesting itself as the dual form warfare postulated by the Tofflers. Regardless, because of the paradigm shifts detailed above, the Clausewitzian construct of massive nations marshalling forces to strike each others' center of gravity has limited applicability both literally and figuratively.

Decisiveness through Dissipative Structures

If war is waged to change an opponent's intentions then a description of change in dissipative structures may provide a better metaphor than forces acting on centers of gravity:

In a dissipative structure, things in the environment that disturb the system's equilibrium play a crucial role in creating new forms of order. As the environment becomes more complex, generating new and different information, it provokes the system into a response. New information enters the system as a small fluctuation that varies from the norm. If the system pays attention to this fluctuation, the information grows in strength as it interacts with the system and is fed back on itself (a process of autocatalysis). Finally, the information grows to such a level of disturbance that the system can no longer ignore it. At this point, jarred by so much internal disturbance and far from equilibrium, the system in its current form falls apart. But this disintegration does not signal the death of the system. In most cases the system can reconfigure itself at a higher level of complexity, one better able to deal with the new environment.

Dissipative structures demonstrate that *disorder* can be a source of order, and that growth is found in disequilibrium, not in balance.⁵³

It should be noted that there are three possible outcomes when stimulus is applied to the dissipative structure. Small, local changes are possible. Alternatively, the quantity or quality of the stimulus may cause massive change, which in turn may result in the self-referenced reorganization described previously. Or, the stimulus may cause the structure to fail.⁵⁴ The outcome depends as much on the dissipative structure as the stimulus.

When applied in conjunction with the context of the new sciences, this description in many ways seems to match the real-life function and process of war, and analogous uses of other instruments of power. Power has been described as the ability to affect the condition or behavior of something or someone.⁵⁵ Presumably, "ability" in this case is non-specific; any resources or methods that "affect the condition or behavior" will do. Or, in other words, the power may be anything that has influence. Its power is not absolute but instead dependent upon the relative degree to which it can be communicated and connected to one's target.

In this model, the effect of power is to stimulate change that will result in self-referenced re-organization of the target. Like all chaotic systems, the target's degree of change cannot be accurately or precisely anticipated but will be similar to its earlier incarnation. Because of non-local effects and critical mass effects, its point of application does not need to be the hypothetical center of gravity, but any catalytic point where access is effective, efficient or economical. In order to be effective, the objective of any application of power must be a process: internally driven, presumably irreversible change. At the same time, the ability to effect the right kind of change, one that is in line with our larger strategic objectives, must be considered in terms of

probabilities and quality of power, as much as quantity. Lasting effects--decisiveness--are achieved only if this process is initiated.

If the dissipative structures model better describes the process of power, than anyone who can initiate the process has significant power. Power might now be re-defined⁵⁶ in terms of what is required to stimulate change: some influence or content possessed by the attacker, that can be *communicated* or transmitted to the dissipative structure, and can *connect* or access the structure, that is, apply the stimulus. Without all three components, the stimulus will fail to affect the structure and induce change. Some stimuli will induce only small changes. But the right combination of appropriate stimuli will induce massive change. The point at which the system exhibits chaotic behavior, that is, either fails or self organizes, might be likened to desynchronization.

This model and the expanded definition of power complete the description of a possible new framework that allows a revolution in thinking, one that might be expected to accompany the revolution in military affairs. Together with the empowering changes of society and the concepts of the today's sciences, they provide a rational foundation from which to consider possible options for our adversaries. Like the homicide detective, though we are not murderers, we can learn to think like one.

This framework avoids, hopefully, "abstractions . . . not related to fact, propositions . . . not illustrated by example, material . . . not related to the problem at hand." Newly described natural phenomena indicate our old foundation for rational thought--Newton's master paradigm--is incomplete. Disciplines of knowledge built on that foundation thus require revision. Our paradigm of war is one such body of knowledge that draws heavily on concepts, metaphors and terms originally defined or re-defined by Newton and his followers. The paradigm shifts described above require us to reconsider their continuing relevance and the manner in which they exclude competing concepts, metaphors, etc. The dissipative structures model and the new science concepts allow us to

consider a new paradigm of war, one that our adversaries may employ . . . consciously or not. What follows is, hopefully, a reasonable "interplay between observable present and hypotheses concerning the timeless phenomenon of war."

Endnotes

¹Anatol Rapoport in his editor's introduction, Carl Von Clausewitz, On War, ed. Anatol Rapoport, (London, Penguin Books Ltd, 1968), 37.

²From the article of the same name by A.J.Bacevich.

³As described by Keegan and Weigley, among others.

⁴Michael Howard, Clausewitz, (Oxford, Oxford University Press, 1983), 1.

⁵Martin Van Creveld, The Transformation of War, (New York, The Free Press, 1991), 34.

⁶Charles Van Doren, A History of Knowledge, (New York, Balantine Books, 1991), 213.

⁷Ibid., 207.

⁸Ibid., 209.

⁹Ibid., 210.

¹⁰Margaret J. Wheatley, Leadership and the New Science: Learning about organization from an orderly universe, (San Francisco, Berrett-Koehler Publishers, Inc., 1992) 29.

¹¹Van Doren, 214.

¹²Ibid., 210.

¹³William E. DePuy, "Concepts of Operation: The Heart of Command, The Tool of Doctrine," Army, Aug 1988. DePuy states "It is a demonstrable fact of life that opposing concepts cannot long coexist. The concept that prevails destroys the other. It is a zero-sum game."

¹⁴Thomas S. Kuhn, The Structure of Scientific Revolutions, (Chicago, University of Chicago Press, 1970), 10.

¹⁵Ibid, 11.

¹⁶Ibid, 152.

¹⁷Van Doren, 209.

¹⁸Michael I. Handel, ed. Clausewitz and Modern Strategy, (London, Frank Cass and Co., Ltd., 1986), 24.

¹⁹Carl Von Clausewitz, On War, Anatol Rapoport, ed. (London, Penguin Books, Ltd, 1968), 13.

²⁰Ibid., 17.

²¹Ibid., 23. See also Martin van Creveld, "The Eternal Clausewitz," in Clausewitz and Modern Strategy, ed. by Michael I. Handel, 47; and Peter Paret's introductory essay, "The Genesis of On War," in Clausewitz, On War, ed. and trans, by Michael Howard and Peter Paret, (Princeton, NJ, Princeton University Press, 1984), 9.

²²Wheatley, 6.

²³Howard, 12-14.

²⁴Handel, 6.

²⁵Wheatley, 17.

²⁶Rapoport, 14.

²⁷Michael Howard and Peter Paret, eds. On War, (Princeton, NJ, Princeton University Press, 1984), 149.

²⁸Ibid., 75.

²⁹Ibid., 139.

³⁰Ibid., 77.

³¹Ibid.

³²Peter Paret, ed. Makers of Modern Strategy: Machiavelli to the Nuclear Age, (Princeton, NJ, Princeton University Press, 1986), 193.

³³Ibid, 191.

³⁴Howard, 2.

³⁵Paret, 191.

³⁶Wheatley, 29.

³⁷Rapoport, 17.

³⁸Wheatley, 6.

³⁹Ibid., 29.

⁴⁰Ibid., 8.

⁴¹Ibid., 10.

⁴²Ibid., 29.

⁴³Ibid., 145.

⁴⁴Ibid., 17.

⁴⁵Ibid., 21.

⁴⁶Ibid., 123.

⁴⁷Ibid., 127.

⁴⁸Ibid., 128.

⁴⁹Ibid., 77.

⁵⁰Ibid., 99.

⁵¹Ibid., 146.

⁵²Ibid., 10.

⁵³Ibid., 19.

⁵⁴Ibid., 96. See also James Gleick, Chaos: making a new science. Gleick repeatedly describes this sequence in his treatment of several systems transistioning into chaotic behavior.

⁵⁵Seyom Brown, The Faces of Power; Constancy and Change in United States Foreign Policy from Truman to Johnson, (New York, Columbia University Press, 1968) .

⁵⁶This definition is derived from one provided by Robert Dilenschneider in Power and Influence: Mastering the Art of Persuasion, (New York, Prentiss Hall Press, 1990), xi. Dilenschneider believes power is a combination of influence, communication and recognition.

CHAPTER FOUR

SPECULATION ON FUTURE WARS

More important still was perception. His adversaries perceived that their own limiting factors applied to others as well. They defined the contest in their terms, and if that's how [he] played the game, then [he] would lose. So his most important task was to make up his own set of rules. And so he would. . . .

- Tom Clancy, from Debt of Honor

The "rules," then, for a framework in which to speculate about possible strategies of notional adversaries are as follows. The RMA and the Third Wave are environments that admit many forms of power that are readily exploitable. The alternative paradigm is one means of determining whether or not these forms of power can be used against America. The concepts of today's new sciences provide new metaphors for conceptualizing the "wars" outside of the mostly Clausewitzian paradigm that is perpetuated by our doctrine and force structure.

Each adversary will be given a strategic objective that would likely be opposed to U.S. interests. A strategy consistent with that objective will be developed in accordance with the framework above. The only principles of the war per se will be those from the new sciences, a desire to circumvent American military strength to the greatest extent feasible, and the exploitation of relative advantage wherever available. In both scenarios, relative advantage occurs not as a result of an attack on our center of gravity but through the use of strategies that are better modelled by dissipative structures.

Case 1

Tom Clancy's Debt of Honor provides an imaginative scenario that includes what might be termed a revolutionary form of war. His plot begins in the American Midwest, where a freak auto accident involving two Japanese compact cars kills seven in a spectacular auto accident. The victims are two teenage girls and all but one daughter--a twin--of a police officer's family. The deaths are attributed to the structural failure of the car's fuel tanks. The fuel tanks had previously been the object of a hotly contested trade issue in which the Japanese refused to accept a fuel tank of U.S. design and manufacture on the grounds of poor quality. The auto industry and Congress seize the unfortunate opportunity to quickly enact a restrictive trade reform bill that establishes a negative quid pro quo between the two countries. Every impediment and obstruction to trade encountered by U.S. products in Japan will be mirrored in the U.S.

The move creates an environment that, from the Japanese perspective, is highly reminiscent to that existing just prior to World War II. Again, it would seem, restrictive U.S. trade practices threaten to strangle the Japanese economy, this time by denying them their largest export market. The shrewd manipulation of the predictable emotional and economic reaction in Japan provides an opportunity for a group of hawks to resurrect dreams of Japanese political and economic independence.

These hawks are the Zaibatsu: 20 or 30 of the very largest Japanese industrialists that form a shadow government through their control of the Prime Minister and members of the Diet. Clancy's construction of the Zaibatsu plan is a thought provoking study in how power may be wielded today.

The Zaibatsu plan includes all of the instruments of power, and is similar in both design and defect to Yamamoto's strategy prior to the Battle of Midway. From December 1941 through June 1942, the Japanese sought a decisive Mahanian battle to eliminate U.S. naval power in the

Pacific. Such a defeat, they thought, would, in combination with the demands of war in Europe, force the U.S. to negotiate a diplomatic settlement. Without the naval forces necessary to interfere, the U.S. would be forced to accept the new status quo: the establishment of the Greater East Asian Co-Prosperity Sphere that extended Japanese hegemony to the central Pacific. Time was a crucial element of the strategy, as it assumed that the Japanese could rapidly fortify their newly acquired islands to an extent that would make unfeasible U.S. efforts to rebuild military power and re-capture the islands. Chance--the absence of the carriers at Pearl Harbor at the first attempt, design--Nimitz's direction to his commanders to avoid a decisive defeat at all costs, and Japanese flaws--lack of agreement between Imperial Army and Navy staffs on strategic priorities, overly complex plans, and expectations of an unreasonably cooperative enemy, combined to deny the Japanese the time to establish their fortified perimeter. They never achieved the relative advantage in military power required to force the U.S. to accept a diplomatic solution.

Clancy's Zaibatsu have ostensibly learned from these mistakes. In Debt of Honor, the U.S. military drawdown and nuclear disarmament are faster and deeper than reality: the U.S. Pacific Fleet is down to four carriers when the U.S. and Russia destroy the last of their ICBMs. Clancy's strategic environment drastically reduces the relative advantage in the military instrument of power that the U.S. has enjoyed for the last half century and his Zaibatsu recognize the opportunity to exploit conditions desired but never achieved in World War II. Again, time is a crucial element of their overall strategy and, again, military actions are designed not to annihilate the nation but to remove military options from U.S. planners and force negotiation and compromise.

Clancy neutralizes the U.S. Pacific Fleet through two devices. First, two carriers are tied to the Indian Ocean to discourage an Indian invasion of Sri Lanka. Indian aggression has been carefully orchestrated

by the Zaibatsu. Second, the other two carriers are "accidentally" torpedoed by a Japanese destroyer during a large scale exercise. The torpedoes do not destroy the carriers but severely damage their screws, achieving a mission kill by preventing the carriers from achieving sufficient speed to launch and recover aircraft. Simultaneous surprise attacks surreptitiously destroy the two U.S. attack submarines participating in exercise related freeplay. The normal lack of communication with submarines provides a convenient device to delay U.S. recognition of what happened. By the time everything has been analyzed and properly associated, the Japanese have invaded the northern Marianas, including Guam and Saipan, using commercial airliners and merchant shipping. They establish a high technology based (improved AWACS, AEGIS/SM-2MR, and diesel submarine) defensive perimeter similar to that envisioned by Yamamoto for the central Pacific. Without carriers, and with relatively few submarines and a smaller, less (and possibly not) technologically dominant USAF, U.S. military options are limited. The Japanese trump is possession of twenty improved Russian ICBMs capable of delivering six or seven warheads each. A small force by Cold War standards, the (fictional) completion of U.S. and Russian nuclear disarmament makes it a powerful relative advantage.

To that extent, Clancy's scenario is rather conventional. But the informational and political aspects of the Zaibatsu plan are striking. All moves are designed to create ambiguity with regard to intent and, when necessary to make public, portrayed as something other than what they are. More than well coordinated deception operations, these instruments constitute attacks as much as the military operations.

After invading Saipan, the Japanese move thousands of citizens there, and lower the voting age to eighteen, which makes their invasion force eligible to vote. Then, in diplomatic negotiations with the U.S., they offer a compromise: leave the fate of Saipan up to a local referendum on self determination. Such an offer poses a difficult problem

for the U.S., which is forced to choose between a vote it can't win and declining a process that is the essence of American political thought. The loss of Saipan by referendum, however, has the same effect as losing the island through invasion.

The Japanese manipulation of the voting population could be viewed as shifting the political center of gravity. Given the relative homogeneity of the two groups of voters, this might be appropriate. On the other hand, if the voting population is viewed as a dissipative structures model, one is forced to reconsider the system dynamics, the internal relationships, and what might now constitute effective stimuli.

Clancy neatly encapsulates another probable dilemma of future war: the participatory role of the press. As Wheatley points out, there is no such thing as objective participation. Reporters collect information, evaluate it, put their own spin on it, and disseminate it, making it available for friend and foe alike to use. In Debt of Honor, Clancy focuses on reporting of the repairs to the carriers, which are central to the U.S. inability to respond to the invasion in an effective military fashion. The initial reports provide the Japanese a window of six months to execute their strategy before the carriers can be fully repaired. But when repairs are limited to the bare minimum required to get one CV operational, the window becomes a week. The National Security Advisor asks the press not to report the departure of the carrier, indeed, to continue reporting its presence in the shipyard. In the book, they agree . . . not because of patriotism, but because of the likely lashback in the event they are perceived to have caused American deaths by telegraphing the counter-invasion.

The military actions are not, however, the Japanese main attack. In fact, the main attack does not employ or target military forces but rather is a deliberate and complex assault on world confidence in the American economy.

The first problem the U.S. faces is recognizing that the naval attacks and the economic catastrophe are related and intentional phenomena. Clancy's Wall Street scenario relies heavily on the lack of a "smoking gun." The smoking gun--catalytic manipulation of U.S. bank stocks coordinated with the malicious dumping of U.S. Treasury notes and currency speculation to undermine the U.S. economy--is eradicated through the artifice of a computer virus in the software that records all stock transactions on the New York Stock Exchange. Until the records are reconstructed, it is impossible to determine the key fact: that the dumping of U.S. bank stocks that precipitate the NYSE crash occurred not as result of normal world market fluctuations but as a result of collusion. Initially, none of his protagonists realize that the stock market crash is a man-made phenomena. Thus, for a critical period, the U.S. government does not realize it has suffered the economic equivalent of Pearl Harbor. Once the situation is clarified, though, it is apparent that the military attacks are a strategic economy of force. The most dangerous threat is the economic attack. The potential trump card is the nuclear capacity that, in the book, only Japan retains.

Arguably, the American economy might be considered a center of gravity. It certainly is a hub of American power. But the economy is not a homogeneous static structure, it is dynamic, distributed and as sensitive to internal conditions as external ones. Neither is it entirely predictable: similar inputs often result in different outcomes. It is for good reason that economics is known as the dismal science. In short, the economy is more like a dissipative structure.

The attack is designed like the stimuli required to initiate the process of change in the dissipative structure. The intentional devaluation of the dollar and U. S. Treasury bonds is one set of stimuli. They are designed to set the conditions for non-local effects. The dumping of the bank stocks is another stimuli, but in conjunction with the declining dollar, it achieves the cataclysmic change inherently possible

in dissipative structures. The worldwide loss of confidence is the ultimate in non-local effects, and the stock market crashes. The worst of the three possible outcomes of change in a dissipative structure--failure of the system--is the goal of the Zaibatsu plan.

The Americans respond to the economic loss in a fashion reminiscent of Saddam's response to the Gulf War: by denying the effect of the victory. This too is consistent with the dissipative structures model. The effect of externally applied stimuli are subject to internal conditions. There is no absolute or objective power, it is highly dependent on the relationship between stimuli and structure. Because there are no records, the desperate stock transactions that occurred as both cause and effect of the crash are considered as never having occurred. The rest of the world (i.e. the European governments and the large investment houses) goes along for two reasons: first because this eradicates their tremendous losses and, second, because it offers them the opportunity to profit from the now invalidated currency speculation that began the mess. U.S. stocks, Treasury notes and dollars, driven down by a crash that now will not happen, are suddenly a great bargain. This, in turn, causes all to dump yen to maximize profits. To stop its catastrophic devaluation, the Japanese frantically buy yen but our ultimately overwhelmed by the coalition against them in what Clancy calls the First Economic World War. The Zaibatsu plan boomerangs viciously on the Japanese. Without the cooperation of other participants in the worldwide economic system, they have little hope of avoiding cataclysmic economic failure.

Clancy's Americans employ the military instrument of power in three ways, virtually simultaneously. First, conventional and special operations target the Japanese AWACs, forcing the Japanese to reposition its most capable naval assets close to Japan to augment air surveillance. This allows the carrier to surreptitiously sail well before expected with roughly twice the normal complement of fighters to destroy the Japanese

forces on Saipan. National reconnaissance assets locate the Japanese ICBMs and they are destroyed by a strike facilitated by the degraded air surveillance net. Finally, the Zaibatsu are, for the most part, assassinated by special operations teams. This allows the legitimate government to reassert control.

Clancy's scenario highlights relative advantage, chaotic behavior, non-local effects, the dominating role of perception, and a departure from the classic treatment of the various instruments of power in war. Twenty ICBMs, for example, are a small force by current standards, but dominant when no one else can match their capability. Four carriers are a significant advantage when no one else possesses them, but can be overextended or countered fairly easily. Targets, gains and losses are increasingly a function of the value we place on them, or what we make of them. Our assessment of what the enemy values may be misguided. Military force is not the only way of attacking what the enemy values. Clancy uses the perceived value of stocks--content and communication--to connect with national economies in powerful ways. The effect is a non-linear process of precipitous decline.

In many ways, Clancy's scenario is consistent with the summary of the "new" paradigm outlined in Chapter Three of this thesis, pages 75 and 76. The value placed on the primary target--the dollar--is highly subjective and only measurable relative to other currencies. The application of power, while conventional in the strictly military arena, is modelled well by processes of dissipative structures. The most dangerous weapons are intangible and work directly on the intellect. While the banks and other financial centers might be considered decisive points, they may be better described as nodes, access points to the economic dissipative structure or field. The effects are non-linear and not subject to objective measurement. Only when the American analysts take a holistic approach and stop compartmentalizing their various problems (in traditional Newtonian fashion) do they see the relationships

between them and the larger pattern of attack. All in all, the scenario is rationally constructed when considered by the standards of the new paradigm.

While it has holes--can an aircraft carrier really sail surreptitiously from Pearl Harbor?--his scenario indicates a recognition that Third Wave changes in society and technology augur the existence of new battlefields, targets, and weapons in addition to the old. Currency, stocks and other financial instruments are can theoretically be employed as a weapon to attack national economies, a primary target. Economic warfare might not be terribly farfetched.

Finally, Clancy addresses the fundamental problem of future warfare: our predispositions and expectations may prevent us from recognizing new forms of attack, innovations that, because of their very failure to match accepted concepts of war, offer tremendous advantage through surprise and our lack of preparedness. This may be his most profound insight.

Case 2

Consider Iran's longstanding desire for hegemony in the Persian Gulf region. Like India a short distance away, Iran sees itself as the natural leader among its neighbors. This leadership is rejected because, despite its power and familiar religion, Iran has a distinctly different cultural heritage: Persian. For this reason it is distrusted by its Arab neighbors.

Control of the region's oil would confer leverage over its Arab neighbors, if not make their governmental structures irrelevant. To this end, Iran has enlarged its Navy and put surface to surface missiles around the Straits of Hormuz. It acquired three Kilo class diesel submarines from Russia, purchased coastal patrol boats from the Europeans, and, allegedly, Rodong missiles (range: 1000km) from North Korea. U.S. Navy efforts to intercept the missile while in transit at sea were

unsuccessful. Iran has demonstrated both the capability and willingness to employ mines.

Recently Iran seized Abu Musa and other islands from the United Arab Emirates. The islands are positioned to control the approaches to the Straits inside the Gulf. They are now garrisoned with troops and surface to air missiles. Recognizing the Gulf Cooperation Council nations' reluctance to accept its leadership, Iran has apparently adopted the long view and seeks control by negation: it has the ability, albeit temporary, to close the Straits of Hormuz. Meanwhile, despite some public overtures indicating a more moderate position vis-a-vis the west, Iran is suspected of continuing to export its radical Islamic fundamentalism to undermine moderate Arab states.

The lessons of the recent past cannot be lost to Iran's leadership. When its war with Iraq evolved to include purely economic targets, the resulting Tanker War threatened to disrupt the flow of oil from the Gulf. Iraq attacked Iran's oil tankers and oil platforms while Iran replied in kind, with the added twist of attacking tankers of those GCC nations like Kuwait believed to be funding Iraq's war effort. The U.S. and its allies responded by reflagging GCC tankers to discourage Iranian attacks. When Iran proved unwilling to desist and was caught laying mines, the U.S. conducted a series of punitive strikes. The strikes destroyed a significant portion of its Navy and several oil platforms.

The pattern repeated itself when Iraq invaded Kuwait. Iraq was thwarted by a coalition of military forces led by America. Iraq's large, reasonably modern and combat experienced army did not seriously challenge the coalition. After a six month build up and an air campaign of several weeks, the ground war lasted only 100 hours. The U.S. has demonstrated its willingness to meet violence with violence, even to the extent of responding with Tomahawk strikes to an assassination attempt on the ex-President. Iran cannot have failed to noticed.

If the blatant employment of military power only invites overwhelming U.S. response in kind, what strategy might Iran adopt to gain control of the region or its oil? How can it circumvent U.S. military superiority? What instruments of power do they have to accomplish their ends?

Iran's economy is slowly recovering from the debilitating war with Iraq. Even so it is not comparable with the wealth of Saudi Arabia. While they possess the most powerful military in the region, its use must be limited by concerns of triggering decisive U.S. involvement. Diplomacy might increase their oil revenues but is unlikely to achieve their goal of control of regional oil.

The export of Islamic revolution is a good starting point, however, for it offers a venue where the Iranians can claim a relative advantage. As fundamentalists, the Iranians are in effect claiming to be better Muslims than the moderate Arabs of the GCC. While not a tangible advantage, it is both powerful and exploitable in the context of the new framework described above.

Viewed in terms of the dissipative structure model and the revised definition of power (content, communication and connection), the Islamic revolution provides Iran the power to dramatically influence its predominantly Islamic neighbors. The "content" is a more radical interpretation of the Islamic religion, which emphasizes solidarity among Muslims, casts the disparity between the wealth of the moderate Arab monarchies and their subjects as the result of greed and exploitation, and views association with the West as indicative of spiritual bankruptcy. Not unmindful of this, the Saudis, for instance, provide subsidies for their subjects and are careful to limit the presence of Westerners in their country. Even Bahrain, the most liberal of the GCC nations, closely monitors the "footprint," or size, of U.S. forces in their country. All Arab nations avoid appearing too closely aligned with the West; recently the Saudis refused to let U.S. agents capture the terrorist suspected of

planning the 1983 truck bombing of the U.S. Marine barracks in Beirut.¹ It is a continuous war of influence and legitimacy, where every action is viewed subjectively, and can have disproportionate effects.

The power of the Islamic revolution is "communicated" in numerous ways. In many, though not all, of the region's countries, the Islamic religious community is, to varying degrees, part of the various echelons of government. Separation of church and state is not an Islamic ideal. The Islamic revolutionary message has access to both religious and political channels.

The news media provide a conventional means of communication. There are Islamic papers, radio and television stations. Radical news media pose an interesting dilemma for moderate states. Efforts to censor the explosive message risks U.S. displeasure at repression while simultaneously opening them up to charges of interfering with religion and being in league with the infidel. Even so, radio and television signals do not respect international borders.

Computers are not as pervasive as in western countries but are not unknown either. Internet is accessible in the region, directly in Kuwait and Turkey, and through other networks in Bahrain, Saudi Arabia, Iran, Egypt and Pakistan. During the Gulf War, Iraq used commercially available network routers and standard Internet routing and recovery technology to complicate U.S. efforts to neutralize their command and control network.²

"Connection" occurs because Islam is the conceptual framework for most Arabs. Like other religions, there is one book but many interpretations. Portions of the radical fundamentalist message by definition coincide with a more moderate message, so even moderate Muslims must constantly weigh political necessity against religious convictions, and determine where the Koran ends and radicalism begins. Like a good lie, Islamic radicalism contains much truth for the average Arab.

The Islamic revolution is for Iran a form of the information instrument of power. Its potential effect is not well captured by the center of gravity metaphor but is by metaphors from chaos theory, quantum mechanics and, not surprisingly, dissipative structures. The connection points of the Islamic revolution are numerous, varied and dispersed. The effects are not predictable or even linear; each message affects each individual and group of individuals differently on each occasion. Following a kind of cultural "strange attractor," the resulting synthesis is a new consensus but similar to its old incarnation; perhaps simply remaining true to Arab and Islamic values. The effects of the radical message are non-local, meaning small incidents can blow up to have seemingly inordinate consequences. If the non-local effects compound with other stimuli, such as repressive security measures, and economic privation, a critical mass may be created sufficient to cause revolutionary change, as happened in Iran in 1979. The revolution causes the self-referenced metamorphosis analogous to that of dissipative structures. The new state, if it survives, will be recognizably similar to its old self but better organized to cope with the environment that stimulated the change. Better organized, of course, does not imply more humane or democratic. The strategic objective of the Islamic revolution is, also not surprisingly, more process than goal: revolution in the countries it targets.

Consistent with the dissipative structures metaphor such change is internal. Internal change poses problems for U.S. intervention, because, presumably, it is the will of the people concerned. There is no clearly defined antagonist to wear the "black hat" and galvanize U.S. public opinion. In addition, the end-state and objectives are generally hard to define. If it grows quickly enough, as change in quantum or chaotic processes do, the window for counterinsurgency may be exceedingly brief. All this militates against U.S. military intervention, a key component of Iran's supposed strategy.

Interestingly, in the past counter-insurgency has been designed to maintain stability, something "unnatural" in the context of the paradigm based on the new sciences. The new paradigm indicates that change is inevitable and in fact required for continued growth. Given the ongoing, dynamic re-distribution of power described by the Tofflers, counter-insurgency efforts might be better designed to employ a "judo" principle, and diffuse the insurgency by giving them (some of) what they want, i.e. empowering them. While idealistic, such a strategy has practical benefits and might be less costly in the long run.

The oil reserves that Iran covets are in Kuwait and Saudi Arabia. While continuing to attack the legitimacy of those two monarchies on religious grounds, it would seem to make sense for Iran to first destabilize Iraq. Iran's support of the Shia rebellion in southern Iraq makes eminent sense, and has historical and, in our framework, theoretical justification. Toppling Saddam allows them to remove a recent and real enemy, secure their western border, gain control of Iraq's not inconsiderable oil reserves and military (including chemical, biological and nuclear programs), and direct (though difficult) overland access to Kuwait and Saudi Arabia. Thanks in part to the West, Iraq today resembles 1979 Iran in many ways: a highly repressive state with a devastated economy and, presumably, an increasingly dissatisfied populace, awaiting only a catalyst.

A significant difference though is that the Shah was correctly perceived as closely allied with U.S. interests. Saddam is not. This puts Saddam's seemingly irrational challenges of U.S. military supremacy and U.N. sanctions in a different light: they can be viewed as wholly pragmatic and prudent. Unlike the Shah, he is fighting the great Satan at every turn, and "the enemy of my enemy is my friend." It would appear to be an effective counter to the conditions caused by economic sanctions that U.S. policy makers hope will encourage his constituency to dump him.

We may in fact be strengthening his hand. Perhaps we should publicly embrace Saddam and thereby seal his doom.

Iran might be better positioned to drive a wedge between Saddam and his people. Although animosities from their decade long war must remain, and the differences between Shia Iraqis and Sunni Iranians are not insignificant, Saddam's legitimacy as paragon of Islamic rule is questionable. In many basic ways he is failing to provide for his people. While his people suffer he is building palatial villas for his family and cronies. His version of justice is unlikely to fit even the most liberal interpretation of the Koran. He is alienated from virtually all other Arab rulers. His only means of support seem to be his animosity to the U.S. and a ruthless security apparatus.

The information technologies of the Third Wave enable the Iranians to wage a virulent disinformation campaign against Saddam. Inexpensive transistor radios could be provided to Shia and Kurdish rebels for further distribution. Sophisticated Iranian broadcasts on radio and television might target specific audiences in Iraq with tailored messages designed to undermine Saddam's legitimacy. One such audience might be his security forces and Republican Guard, forcing them to reconsider their loyalties to Saddam and Allah. Other broadcasts might include real or fictional accounts of atrocities committed against Iraqi citizens by Saddam, and his association with the U.S. during the Iran-Iraq War. At an appropriate time, a trial and condemnation by Islamic fundamentalists might be staged. Coupled with Saddam's own propensities, the continuing economic hardship and repression, and perhaps some chemically or biologically induced plague, such a sophisticated information campaign might be the catalyst for Saddam's overthrow. Iran, then, would seek decisive effects through relatively small stimuli. It is the dissipative structures model of the informational instrument of power. Again, by the standards of the new paradigm, there is reason to believe this can be effective.

Iran would be the most ready to respond to his downfall, especially if it was arranged with Iranian collusion. Equipped with the mobile forces, transports and communication equipment that they possess or can easily acquire, all part and parcel of the RMA, and increasingly de rigueur, Iran could conceivably seize control of Iraq and install their own fundamentalist government before others could organize sufficiently to challenge them. (Again, differences between Shia and Sunni presented difficulties that cannot be discounted, but are beyond the scope of this thesis.)

In this scenario, it is unlikely that control of Iraq would satisfy the strategic objectives of Iran. Iran's leaders might at this point consider two options. Option one would be to consolidate their gains and continue to rely on the non-local effects of Islamic fundamentalism to weaken the monarchies' hold on Kuwait and Saudi Arabia. Option two might be to accelerate the time table through direct action. The direct action does not necessarily mean military action. Rather, it can be anything that "connects" with their adversary's dissipative structure and thus has a likelihood of causing disproportionate effects. Their decision would likely be based on the progress of the revolution and their assessment of potential U.S. involvement.

Iranian expansion into Iraq would cause much uneasiness among Arab neighbors and U.S. policy makers. A probable outcome would be offers of increased U.S. military presence and assistance packages. But heightened concerns about fueling the spread of Islamic fundamentalism would make both a difficult political choice for Kuwait and Saudi Arabia.

Conceivably, it is to Iran's benefit to encourage U.S. deployment to the region. On one level, it would be consistent with a sophisticated diplomatic and information campaign to decouple the revolution in Iraq from U.S. concerns about its vital interest, oil. Until ready to attack Kuwait and Saudi Arabia, a savvy Iran might seek to demonstrate that U.S. and GCC interests in continued oil flow coincide with their own, and that

their participation in the Iraqi revolution was based on invitation and justified by Islamic concern for the welfare of their brethren. To provide convincing evidence supporting their rhetoric, Iran might open their common border for trade, sponsor humanitarian relief missions (including Red Crescent and NGOs from the west), and initiate regional security and economic treaties with bordering countries. Each action would be designed for maximum exposure in worldwide print and electronic media, and aimed at dissipative structure-like audiences around the world. Learning from the Kuwaitis example during the Gulf War, the Iranians might be reasonably expected to employ well-known and respected public relations firms to make their case to American and European governments and populace. The diplomatic / information instruments will shape worldwide opinion--a new but nonetheless crucial battlefield--in preparation for future Iranian operations.

A second reason early U.S. intervention might work to Iranian advantage also focuses on disproportionate effects outside of the region. Force projection is not easily repeated often. Each mobilization and deployment forces America's leaders to expend political capital. The American political environment is such that the threat must be real and the deployment have readily apparent purposes. If an early deployment appears not to have been justified, the next one may require a higher standard of proof. The Iranians gain by making it potentially more difficult for the U.S. to decide to project power in the future.

A third way they may benefit is from real or contrived incidents that embarrass both the U.S. or its Arab hosts. The spectrum of possibilities range from routine infractions of cultural norms to something similar to the accidental downing of a Iranian commercial airliner by the U.S. Navy. Each incident provides ammunition--influence--to the fundamentalists, erodes the legitimacy of the monarchies, and makes U.S. presence harder to accept. Again, a key, recurring theme here is that small incidents can have disproportionate, even decisive, effects.

While certainly not guaranteed, that outcome has some probability. That alone recommends it to those who otherwise have little hope of achieving their ends.

At some point later, with the fundamentalist message continuing its work, U.S. military power in the region reduced, and force projection a tougher "sell" both to the Arabs and the American public, conditions would be right for the Iranians to annex Kuwait and, possibly, the Saudi oil fields. Again, a sophisticated mix of fundamentalism, Third Wave information technologies and the information instrument of power is likely an important component of the overall Iranian strategy.

Riots between fundamentalists and Saudi security forces have occurred with increasing frequency at the holy cities of Mecca and Medina. Thus far, the fundamentalists have not capitalized on the propaganda potential such incidents possess. Should the fundamentalists be able to record and broadcast heavy handed Saudi efforts to restore order, including again real or contrived examples of bloody excess, they may further the perception of the monarchy's lack of true legitimacy. Camcorders are now comparable in size to the average 35mm camera and satellite broadcast equipment is manportable. Although the Rodney King-videotape-Los Angeles riot scenario is not directly transferrable to Saudi society, with sufficient preparation and in conjunction with other efforts such an effect is not impossible. If sufficient disorder forces the Saudis to threaten to close the cities, this too may work in Iran's favor: it potentially denies Muslims worldwide the opportunity to fulfill a requirement of their religion: the Hajj. This alone might justify Iranian intervention.

After similarly arranging "justification" in Kuwait, the Iranians might strike. Even coordinated with an insurgency and taking advantage of RMA technology, the Iranians would need significant military force in this scenario. Timed to coincide with the absence of a U.S. carrier battlegroup in the Gulf, and, if possible, the turnover of USAF squadrons

in Dharan, their operational objectives would be to neutralize U.S., Saudi and Kuwaiti defense forces, seize the oil fields, discourage U.S. intervention, and if necessary deny the U.S. entry points to repeat a Desert Shield-like build up.

Non-lethal biological or chemical agents introduced via the water supply or IRBM aerosol bombs could be used to severely degrade critical U.S., Kuwaiti and Saudi military forces. Non-lethal agents enable the Iranians to claim the moral high ground, take hostages, and use them as diplomatic leverage against U.S. intervention. Similar measures might be employed to capture key members of the extended Saudi royal family, and disrupt activities in Riyadh. Iranian control of the royal family reduces U.S. options for installing an alternative government. The royal family may be held hostage, awaiting trial for transgressions against the "true" Islamic code and possibly used as leverage against western intervention. Alternatively, if the spectacle of public trial, imprisonment or execution is expected to be too divisive or controversial, the Royal family may be killed outright or made to simply disappear.

Western hostages, on the other hand, are much more valuable alive than dead. It is to Iran's advantage to minimize the number of casualties to western workers and their families in order to reduce justification for intervention. On the other hand, hostages taken for "safekeeping" create internal pressures on their governments to both resolve the crisis in a manner that minimizes jeopardy to the hostages. Repatriation would be understandably slow due to the general unrest inherent in the revolution. The hostages, however, are newsworthy, and media interest in them presents an opportunity for the Iranians to publicly demonstrate their health and welfare while reiterating a "firm but fair" message: they have no ill will towards the American people per se, and intend no harm to their "guests," but cannot tolerate outside intervention in an Islamic jihad. The hostages will be released when the situation stabilizes. Whether this is an act of terrorism or an act of war is subject to debate; but that it

would provide a certain amount of leverage is not. Such leverage is subjective, and dependent mostly on conditions in the host country, as indicated by the new paradigm.

If they can gain control of Kuwaiti and Saudi monetary reserves before they are put out of reach, the Iranians might engage in currency manipulation to discourage intervention. This may sound farfetched. However, in times of crisis such assets are "frozen" not by posting guards at a bank but by securing them electronically. This makes it a question of timing, knowledge and access. Electronic thievery and computer piracy are not without precedent. Using Saudi and Kuwaiti money, the Iranians might buy U.S. dollars and Treasury notes, forcing the dollar up against foreign currencies and instantly making U.S. exports more expensive. The stock exchanges and the U.S. economy would be immediately negatively affected. The Iranians might then threaten to sell off their holdings in order to rapidly devalue the dollar. The resulting speculation and uncertainty would cause a loss of confidence in the economy. This "greenmail" is also not necessarily farfetched: currency speculation has exceeded the ability of the central bank system to control it. Here, then, the Iranians use the relative value of money as content, dollars to communicate, and connect with the American economy in an attempt to influence American policy. Such policy is not the product of a monolithic central power but of a field of power that includes politicians, bureaucrats, journalists, pundits and the public. Here, too, the most descriptive metaphors are from new sciences: the economic and political effects will be non-local and non-linear, unpredictable but recognizably bounded, and if carried on past a certain point, achieve a critical mass of crisis proportions. There appears to be significant leverage in the economic instrument of power.

As Iran perceives the U.S. moving towards military intervention, they might be expected to resort to preventative and pre-emptive efforts to deny or disrupt power projection. Diplomatic measures might include

efforts to encourage North Korea to become more active, preventing the U.S. from drawing from forces stationed in the vicinity. The Straits of Hormuz would be obstructed by sinking large tankers, and if war is inevitable, mined. Pier facilities at Persian Gulf, North Arabian Sea and Red Sea ports would be rendered unusable or rigged to be made so. The Maritime Prepositioning Ships in Diego Garcia, Guam and elsewhere might be sabotaged by swimmers, jet-ski embarked terrorists, an explosives laden merchant, or a subverted member of the maintenance crew. Damage to the main reduction gears and shafts would require time consuming repairs. Similarly, in America, strategic lift aircraft at various locations might be targeted by mortar, small planes, etc., in an effort to strike before the U.S. takes appropriate security measures at home. While certainly unable to deny all lift, the combination of reduced and degraded entry points, loss of important heavy and rapid lift assets would force the U.S. to recalculate feasibility estimates. The Iranians may be able to delay for quite some time our ability to conduct meaningful forced entry operations. Each day of delay might make force projection less likely as America copes with the new status quo. Presumably, coping with the new status quo past a certain point indicates it is no longer an unbearable threat requiring war. If valid, this "use it or lose it" aspect of force projection has not been much discussed.

Still attempting to capitalize on earlier efforts to decouple issues of legitimate Islamic rule from U.S. concerns about oil, they might also warn of their unwillingness to tolerate U.S. interference in these Arab-only matters. Warnings might indicate the willingness to use any means to prevent U.S. intervention. In light of the Iran's hypothetical acquisition of Iraq's chemical, biological and nuclear programs, such a threat would have some credibility.

The implications of such a threat might include selective employment of chemical weapons in theater and for terrorist demonstrations here at home. Persistent chemical agents at regional airports and

seaports are one means available to the Iranians to complicate U.S. force projection. Although such measures will not ultimately prevent deployment, it will delay it and decrease its tempo. In a significant break from past thinking, destruction is not necessarily the primary objective. It may be beneficial from their perspective to announce these actions as they occur, as a demonstration of resolve but also to demonstrate unwillingness to cause unnecessary casualties, to escalate fears of high casualties, and increase American public debate over involvement and the likely costs of such involvement. Iran's initial efforts might be, as previously indicated, designed to minimize response provoking U.S. casualties, while making every effort to heightening fears of casualties.

As a measure of last resort, the oil fields might be rigged for destruction by conventional, nuclear or biological (genetically engineered oil eating enzymes) means. The Iranians could threaten to make the oil fields unusable. This threat alone would increase oil prices, if considered credible. If carried out, it would effectively increase Iran's share of remaining world oil reserves.

Satellite ground stations are another likely target, and satellites that cannot be neutralized in this fashion might be targeted with jamming, spurious instructions, software anomalies like computer viruses or even physical destruction. The ability of the Iranians to do this is certainly questionable now, but not through the foreseeable future. The break up of the former Soviet Union has flooded arms markets with Russian military equipment and Russia's economic problems provides that country with strong incentive to continue profitable arms sales. More worrisome, though, is the so-called "brain drain," the movement of weapons experts from economically troubled countries like Russia to countries and organizations that provide strong economic incentives. Although usually invoked vis-a-vis nuclear weapons experts, the concept is equally applicable to conventional weapons experts. U.S. feasibility and

acceptability estimates usually assume technological superiority. The increased movement of weapons experts may begin to limit the applicability of that particular assumption.

Japan, too, might be the source of high technology required by the Iranians. Natural resources in general and oil in particular have been an historic Japanese vulnerability. Japan presently imports all of her oil; 60 percent from the Middle East. In return for technology (e.g. AEGIS and SM-2, the cutting edge of U.S. Navy surface to air systems), and neutrality in this hypothetical crisis, the Iranians might offer guaranteed oil supply and rates. Although presently inconceivable, a Japan less aligned with U.S. interests might find such a strategic alliance beneficial and prudent, particularly if the technology transfer was difficult to trace back to Japan.

At this point then the Iranians have used the Islamic fundamentalist revolution and a not altogether unconventional insurgency to progressively destabilize Iraq, Kuwait and Saudi Arabia. What's more, the endgame in each case included modernized but conventional military forces. Perhaps this is an example of the self-similarity and strange attractor principles of the new science: any new incarnation of something bears much resemblance to its former self. Modernization included technologies typically associated with the RMA and readily available in the arms market, but the scenario did not address the changes in organization and operational doctrine likely to be necessary to fully exploit their potential. The end state, while apparently achieving their strategic objective, did not "prove" U.S. military power had been permanently circumvented.

On the other hand, despite some leaps of imagination and some holes, the speculation above does indicate that a country such as Iran has available the ability--the power--to wage war on terms that minimize U.S. advantages in military power and maximize their own alternatives. Technology transfer, "civilianization" of defense industries, the rise of

dual use technology, proliferation of weapons of mass destruction, etc., all work to mitigate the technological edge the U.S. relies upon. This changes feasibility and acceptability estimates for predominantly military courses of action.

Our force projection strategy provides some significant opportunities for adversaries to exploit. Lift assets are finite and not easily replaced. So are points of entry into a region. Both represent vulnerabilities as well as opportunities. The possibility that there may be a window of use for force projection, i.e. that, politically we can deploy too early or, by waiting, lose the opportunity to exercise that option, is an interesting notion that bears further investigation.

The scenarios indicate also that economic and information instruments provide a form of power that, more than ever before, can be exploitable in war. The U.S. does not hold as great an advantage in these forms of power as in the military instrument. Thus the relevance of these instruments has increased for our adversaries. And, finally, although contrived, these scenarios seem to indicate that the new developments in society and science can be combined with non-traditional if not revolutionary thinking to wage a different kind of war. The dynamics of of new forms of power can be understood by using the content, communication, connection definition of power and the model of dissipative structures.

Endnotes

¹"Saudi moves draw rebuke from U.S.," Kansas City Star, 21 April 1995, A-4.

²John R. Levine and Carol Baroudi, Internet for Dummies, (San Mateo, IDG Books, 1993), 12.

CHAPTER FIVE

CONCLUSIONS

The dogmas of the quiet past are inadequate to the stormy present. As our case is new, we must think anew, and act anew.

- Abraham Lincoln¹

It is the old the prevents us from recognizing the new.

- Comte

This thesis asks a simple question to stimulate thinking about the future of war: How might our adversaries wage war against the U.S.? The effort was likened to that of the homicide detective who carefully investigates the crime scene and surrounding circumstances, attempts to develop insight into the perpetrator's mind, and then reconstruct the crime. That, more or less, has been the design of this thesis: Chapter Two presenting evidence of profound changes in society, science and warfare; Chapter Three developing a rational, albeit markedly different, intellectual framework--paradigm--for those who might attempt to circumvent American military power; and, in Chapter Four, a projection, rather than reconstruction, of how such attempts might be consummated. This chapter provides an assessment of consequences and implications of the preceding ideas.

The basic presumption remains that, despite our status as the sole remaining military superpower, wars have not become extinct. Instead, war will change--as it always has--to fit the current circumstance. Other nations, groups, etc., will still disagree, sometimes violently, with U.S. policies and actions. In the face of overwhelming U.S. military might, intelligent adversaries will seek alternatives that allow them to avoid our military strength while pursuing objectives and

interests that conflict with our own. This line of reasoning will cause our adversaries to consider non-military ways of imposing their will on us. And because of this, they have greater reason to innovate. To anticipate their solutions--our future threats--a new way of thinking is required, one that exploits the conceptual possibilities of today's science and society.

This attempt to update our concepts of war with new knowledge is not without precedent. In the 17th century, Montecuccoli became "the first modern theorist to attempt a comprehensive analysis of war, in all its aspects." Incorporating the prevailing popular concepts of "law" and "systems," Montecuccoli searched for a universal paradigm that would integrate all knowledge derived from experience, but constrained himself to a framework within the teachings of the Catholic Church. Predictably, this proved impossible.² A century later, as the Industrial Revolution took hold, Heinrich Dietrich von Bulow and Carl von Clausewitz attempted to analyze the concurrent revolution in military affairs.

In 1799, Bulow recognized that recent changes in war constituted a revolution, but failed to understand its nature. Believing that the problem was one of structure and geometry,³ Bulow tried to demonstrate that enduring geometric principles underpinned success in war. His attempt failed and his later writings either abandoned the theory or erratically contradicted it.⁴

In 1805, Clausewitz sought to establish himself by refuting Bulow. Clausewitz "proposed definitions that were functional and applied to every war, past present and future . . . [and] insisted that any meaningful theory should be able to accommodate all elements pertaining to its subject, [and that] Bulow excluded essential parts of war." The latter charge notwithstanding, Clausewitz too selectively developed his principles from wars after the 17th century. But of the three, only Clausewitz achieved lasting recognition because he "developed the

generalizations, the high levels of abstraction that give [his work] lasting value."⁵

Perhaps Clausewitz benefitted from the strong tradition of analysis present in Berlin when he arrived there in 1801. From 1741 to 1786, the two greatest mathematicians of the century taught at the Berlin Academy. Hired at the request of Frederick the Great, first Euler (from 1741 to 1766) then his protege Lagrange (from 1766 to 1786) converted Newton's geometric calculus to an algebraic calculus of variations, otherwise known as analytical calculus, and applied it to create still valid general equations in mechanics and optics.⁶ These general, algebraic equations, emphasize variables to permit tailoring the general equation to virtually all specific circumstances. Though Clausewitz disdained mathematical equations to model war, the concept of the general equation of variables is analogous to what he sought in a theory of war and is a key reason for its enduring utility. Although he could not anticipate all of their infinite variety and combinations, he understood they created a new form of war each time. To Clausewitz, the only constant was what might today be called his "strange attractor" of war: his remarkable trinity of rational thought, chance and violence.

Clausewitz used concepts drawn primarily from Newtonian science to develop his framework of the rational part of war. Since Newton provided the theory for a large part of the Industrial Revolution that shaped society, Clausewitz's paradigm of war remained consistent with society's development. Clausewitz's "general equation" continued to be mostly accurate despite the changes in the variables. But today, another revolution is overtaking the Industrial Revolution and removing the context into which Clausewitz's general equation fit.

This new revolution, known as the Post-Industrial Revolution, the Information Revolution, or the Third Wave, empowers individuals, primarily through the egalitarian distribution (or availability at least) of knowledge. From knowledge, a form of power in and of itself, comes the

ability to generate other forms of power. Thus individuals and small groups can and do create or obtain weapons and wealth exceeding that of some nations. The relative monopoly of power held by the state when Clausewitz developed his theory and throughout most of the Industrial Revolution is no more. The resulting dynamic distribution of power is no longer best described by the Newtonian center of gravity metaphor adopted by Clausewitz. The rules of the game have changed. This is the essence of the current revolution in military affairs: it is an effect of the larger revolution, not a cause in and of itself.

The single common theme in the debate over what delineates a revolution from ordinary evolution, in society or military affairs, is that a revolution causes this change in the rules of the game. This thesis argues that such revolution is the result of a revolution of thought. In military affairs as in society, those who most rapidly adapt to the new rules achieve a significant, if ultimately temporary, relative advantage. This relative advantage is then exploited for as long as possible to achieve one's objectives. From the perspective of those disadvantaged by the new situation, there appear to be three likely sequels: they adapt and mitigate the relative advantage; they are overcome by the enemy's exploitation of the relative advantage; or they accept the new status quo. Put another way, they either learn to play the new game, risk probable defeat by what they might consider cheating, or stop playing to win. The dynamics of the so-called revolution--the threat of losing power on the one hand and the opportunity of gaining power on the other--force all to adjust to the new environment.

Technology has most often been the fulcrum about which revolution turns. This is because new technology, by definition, offers the potential of getting things done more easily, effectively, efficiently, than previously possible. Provided it can be exploited, new technology offers greater relative power. Acquisition of the technology, however, does not necessarily guarantee the ability to use it effectively. The

technology, the infrastructure required to effectively employ it, or the relationship between the two may not be sufficiently mature to achieve a significant advantage over the old ways of doing business.

Thus writers on RMA and military innovation such as Krepinevich and Rosen insist correctly that, historically, the potential of technological change has been fulfilled only when accompanied by adaptation in organization, new operational doctrine, and prudently integrated into the existing system. This results in "a dramatic increase - often an order of magnitude or greater - in the combat potential and military effectiveness of armed forces."⁷ Military power is significantly enhanced. New forms of warfare develop to exploit the new opportunities, and the window of the relative advantage is dependent on the adaptability and agility of the adversary. If this synergy is achieved only by one group, it confers a dramatic relative advantage. Such was the case with Napoleon, blitzkrieg, and, to a certain extent, nuclear weapons.

Powershift, the paradigm shift in power integral to the Third Wave described by the Tofflers and detailed here in Chapter Three, indicates that this synergy is more readily attainable than ever before. The increasing articulation of power means that smaller groups can exercise greater power. User friendly and dual use technology drastically reduce the indoctrination period required to master these tools. Large organizations made ready by lengthy, expensive, and massive training pipelines are no longer the optimum means to exploit temporary relative advantages. They are, in fact, being shown to be often at a disadvantage in the business world. In a process described as de-massification, the new business environment is forcing large businesses to re-structure themselves into smaller, more agile, adaptable organizations. The businesses are emulating dissipative structures.

Continuous adaptation is required because the rules of the technology transfer game have changed. The virtually uncontrollable communication of knowledge, through computer networks, other electronic

media, "braindrain," greater individual mobility etc., threatens any strategy that relies predominantly on a lasting technology advantage. As in the personal computer business, each new iteration of technology is a quantum improvement in power and usability. The trend favors those who can adapt most readily.

This is where the revolution in military affairs offers opportunity to our adversaries. Technology will continue to adapt, and if the Tofflers and other commentators are correct, the rate of innovation will accelerate. Each new innovation that offers quantum improvements in relative power seems to ease the problem of requisite changes in organization, doctrine and systems integration. In dual use technologies, market competition demands what one personal computer manufacturer advertises as "oobe:" out of box experience. The new, powerful tools of the Information Age must be ready to use right out of the shipping package. The timeline between acquisition and mastery of power is growing shorter and its magnitude relies less on quantity than quality. In our adversarial relationship to the Soviets, we sought to exploit our greater technological agility, in new powerful ways. The RMA offers the same strategy to our adversaries.

For every Corbett, there is a Mahan, for every Clausewitz, a von Bulow. For each theorist who developed a concept of war that stood the test of time there are many more who missed the mark to a lesser or greater degree (usually the latter). It is relatively easy to conceive of a prescriptive framework and look for historical events that fit. It is less easy to develop a useful framework that is consistent with events past and present. Yet perhaps the framework offered here has some utility because it does not rely on any science in particular nor seek any absolute principles. It merely suggests that man-made processes mirror natural processes. Nature now tells us that if one has access to something, and can connect with it, the stimulus will change it to some degree. But, significantly, lasting or decisive change only occurs when

outside stimuli cross some threshold that initiates an internal process of change. When the thing in question changes, adapts to stimuli from its environment, it will be much like its former self, but different in unpredictable ways. There is, as yet, no sure way to determine the specific differences, only probabilities of their occurrence. Unintended effects are not only possible but probable. All of this matches our collective intuition regarding human events, what is new is the recognition of empirically observed natural phenomena that bear it out.

Natural phenomena also imply that absolutes do not exist. Everything must be considered in its environment or system, nothing can be "known" except in relationship to something else. Today's sciences indicate that nature may have no objective reality. Relativity is the norm. Objective measurement is impossible because the mere act of measurement causes unpredictable changes; the measurer becomes part of the system. The man-made corollary to this is the role of the news media in world events today. Considered in terms of the definition of power presented here--content, communication, and connection--the media shape information (content), communicate it to dissipative structure-like organizations, and use ratings and public opinion polls to ensure they maintain the connection with their target audience. If this is a viable model for power, and it appears to be so, it refutes a long cherished notion of the media: the ideal of objective, non-participatory reporting. The new sciences imply that the media cannot help but participate in that which they report on. And the lack of a monopoly of power by any one media organization (even CNN is more ubiquitous than omnipotent) indicates that the media too might be considered as a dissipative structure.

If the distribution and diversification of power make dissipative structures a useful model, war might be perceived a conflict in which adversaries attempt to change each other. In dissipative structures, decisive change is linked to the ability to stimulate the internal process of self organization. The corollary in war might be that decisive victory

will go to the side that can best initiate such change in its adversary. The side that can do this--or possesses this "power"--has a significant relative advantage.

Power, then, becomes simply the ability to affect the condition or behavior of something or someone.⁸ Any resources or methods that "affect the condition or behavior. . . ." confer power. The type or form of power, is no more or less important than the ability to communicate it and its ability to connect meaningfully to the adversary. Different forms of power then can conceivably be used interchangeably. A relative advantage in one instrument of power may be equally threatening as a relative advantage in another.

Consequently, if one form of power may be reasonably substituted for another, then other instruments of power can theoretically be employed to circumvent American military superiority. Yet our commonly held presumptions about power make sharp distinctions on the basis of ways and means. But the theory and scenarios developed here imply that power is simply the ability to accomplish one's ends. The means employed are significant only in that they are effective. No single combination of ways and means (or instrument of power) possesses any mystical advantage over any other. Such combinations are only more effective or less effective, more efficient or less efficient, more palatable or less palatable. Conceptually consistent with the new framework developed, power is inescapably relative. Mao's revolutionary warfare might be seen as a manifestation of this: He used information--propaganda and re-education programs--to develop a force that was otherwise deficient in traditional economic and military power. He leveraged one form of power to acquire another.

Despite the obvious inference to the contrary in Lord Acton's famous dictum, there exists no such thing as absolute power. The absolute power that corrupts absolutely can only exist in relation to other, varying degrees of lesser power. There is no power independent of "human

perception, valuation and cognition," as the definition of absolute would infer. Because of this, power is, in consonance with today's science, intrinsically relative and subjective. These qualities support the idea that power must be commutable. Perceptions alone determine whether one form is more or less powerful than another.

Some may question the relevance of a framework for war that addresses threats of other than military power. For many, "non-military" often seems to mean non-threatening. The scenarios indicate this is misguided, however. Whatever the ways and means employed, our adversaries will still pursue objectives and interests antithetical to our own. If power is relative, then our predisposition to measure (national) strength and threats by the quality and quantity of military might possessed creates for us a blindspot which our adversaries may unexpectedly exploit or attack. Conceivably, because of this predisposition, we might not recognize such an attack until too late. If circumventing U.S. military strength is not sufficient motivation for our adversaries to investigate these options, perhaps the opportunity to achieve surprise is.

By invoking paradigm shifts, I have arguably rewritten the rules to justify the scenarios which, in turn, purport to show how the rules may have changed. The logic is admittedly somewhat circular. But if one accepts that the paradigm shifts are real, then "all bets are off." All rules must be zero-based; reevaluated to determine their continuing relevance and applicability.

The rules of the new paradigm, characteristics really, might be summarized as follows:

1. War is a violent contest of power.
2. Power can exist in many forms.
3. Each side will naturally seek a relative advantage, pitting strength against weakness; this leads to circumventing action.

4. Circumventing action encourages the employment of different forms of power. This, in turn, implies new weapons, new targets and new battlefields; a revolutionary new form of warfare. This is how the revolution in military affairs will manifest itself. Significantly, our potential adversaries have greater motivation than America innovate.
5. The form war will take might be anticipated by using the model of dissipative structures and the content / communication / connection definition of power. A careful assessment of each potential adversary's available types of power (content), their ability to transmit it to us (communication), and the degree to which the power actually can interface with us (connection) might preclude a surprise attack based on a revolutionary ideas. Such an assessment might also preclude the arbitrary dismissal of a new concept or technology as not relevant to the problem at hand.
6. Victory goes to the side with the greatest relative advantage; lasting decisiveness is attainable when internal self-referenced change is initiated.
7. The way we make war is the way we *think*. Our perceptions and thought processes dominate war. Thus, a revolution in military affairs can fulfill its potential only with a concurrent revolution in thought. Today's sciences and changes in society make possible such a revolution. The best metaphors to describe the processes and functions of warfare involving Third Wave participants are derived from Third Wave sciences: chaos theory, quantum mechanics, morphogenic fields, and dissipative structures.

As noted earlier, Theodore Ropp made a strong case for considering war as "a process of change in its socio-political, technological and organizational aspects." This thesis has attempted to weave apparently congruent processes of change into a tapestry depicting logical implications. The RMA cannot be viewed outside of its context.

In context, it appears that this revolution in military affairs is not the quantum improvement of traditional methods of warfare but a revolutionary way of thinking about war and the subsequent transformation of warfare into a new but still familiar form, which in all likelihood adheres only to Clausewitz's trinity of rational thought, chance and violence.

The fact that Blitzkrieg, submarine warfare, or Napoleon's decisive battles were "new but recognizably familiar" did not help their respective victims. Each of these innovations was, at some point, adjudged as irrelevant, insignificant or simply not threatening by its seemingly more powerful potential victims. If history is not to repeat itself at our expense, we need to consider how circumventing action fosters innovation, and innovation often leads to revolutionary concepts that rewrite the "rules of the game." Like the detective, we need to think like the suspects, and observe where the opportunities in the ongoing transformation of science and society meet their need to circumvent our strengths. The framework presented here is one way to begin.

Endnotes

¹James M. McPherson, Abraham Lincoln and the Second American Revolution (New York, Oxford University Press, 1990), 41, as quoted by James J. Schneider, The Structure of Strategic Revolution: Total War and the Roots of the Soviet Warfare State, (Novato CA, Presidio Press, 1994), 99.

²Gunther E. Rothenberg, "Maurice of Nassau, Gustavos Adolphus, Raimondo Montecuccoli, and the Military Revolution of the Seventeenth Century," in Makers of Modern Strategy: Machiavelli to the Nuclear Age, ed. by Peter Paret (Princeton, NJ, Princeton University Press, 1986), 55-56.

³Peter Paret, "Clausewitz," in Makers of Modern Strategy: Machiavelli to the Nuclear Age, ed. by Peter Paret (Princeton, NJ, Princeton University Press, 1986), 190.

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⁵Paret, op. cit., 188-190.

⁶Will and Ariel Durant, The Age of Voltaire, (New York, Simon and Schuster, 1965), 510-512.

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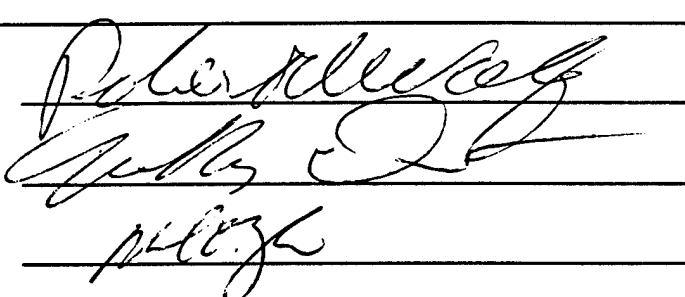
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